Engineering Library
JUN 3 1922

# Telephony

THE AMERICAN TELEPHONE JOURNAL

PUBLISHED EVERY WEEK
BY TELEPHONY PUBLISHING CORP.
116 S. MICHIGAN AVE., CHICAGO, ILL.

JUNE 3, 1922. [VOL. 82. NO. 22.]
Entered as second-class matter Sept. 4, 1908, at the post office at Chicago, Ill., under act of March 3, 1879.

SINGLE COPIES, 10 CENTS
YEARLY, U. S. A., $3; CANADA, $4
ALL OTHER COUNTRIES, $5

ANACONDA
Copper Telephone Wire
Tie Wires
543 Conway Bldg.
CHICAGO

EVERSTICK ANCHORS lead the world in anchor sales.
WHY?
EVERSTICK Anchor Co.
St. Louis, Mo. U.S.A.

PEIRCE POLE SEATS
Galvanized or Painted.
Have held a dead load of 1740 pounds without the slightest deflection.
Frames are of channel steel. Made in two styles —with bars or wood seats.
Ask your jobber.
Hubbard & Co., Pittsburgh, Pa.
The Hardware makes the line; Hubbard makes the Hardware

Telephone Cables
ALL SIZES AND CAPACITIES
Hard Drawn Copper Telephone Wire
Galvanized Iron Telephone Wire
Siemens-Martin and High Strength Strands
AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.
CHICAGO—112 W. Adams St.
CINCINNATI—Traction Building
NEW YORK—233 Broadway
BOSTON—176 Federal St.

Naugle Poles
IMMENSE STOCKS—Northern and Western Cedar.
24 HOUR LOADING—ordered 9 A. M.—en route 5 P. M.
BUTT-TREATING—any form —open-tank method. We PENTREX treat.
NAUGLE POLE & TIE CO. 5 So. Wabash Ave. CHICAGO, ILL.
New York Columbus, O. Kansas City Boston Spokane
MAIN YARDS: *Chicago, *Pinconning, Mich., Green Bay, Wis.
*Pentrexing and treating plants at these yards.

Look for the Black and White Stripes
BURGESS BATTERY COMPANY
Stock Carried at DEPT. F. Madison, Wis.
Chicago, Kansas City St. Paul

American Steel & Wire Co.'s
W & M Telephone Telegraph Wire
Strand—STEEL WIRE
Pole Steps
Descriptive literature—free
American Steel & Wire Company
Chicago New York

CEDAR POLES
Wire or write for delivered prices
NATIONAL POLE CO.
ESCANABA :: :: MICH.
220 Broadway, New York
2844 Summit St., Toledo, Ohio
Rialto Bldg., San Francisco

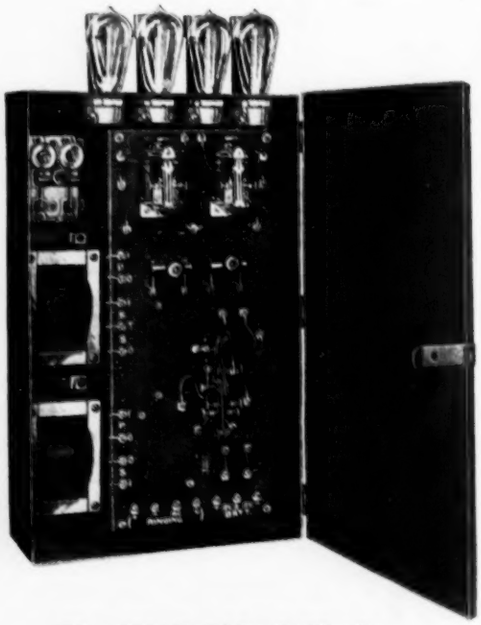
FORT WAYNE PRINTING COMPANY
FORT WAYNE, IND.
Printers and Blank Book Manufacturers
Write for Samples and Prices on I. C. C. Forms
Ours Are the Best

THE THIMPULEYE SAVES TIME
The Size is on the Eyes of
MATTHEWS SCRULIX ANCHORS
No chance of using wrong size without immediate detection
W. N. MATTHEWS & BRO., Inc.
St. Louis, Mo.

# POWER PLANTS FOR MAGNETO EXCHANGES

**Live managers have equipped their exchanges with up-to-date power plants consisting of Leich combined Ringing and Charging Machines with storage batteries.**

**Note the features that have influenced their judgment.**



**No. 121 Combined Ringing and Charging Machines.**

**Passed by National Board of Fire Underwriters.**

**Uninterrupted ringing service.**

Interrupted power service does not effect the ringing current. It is not necessary to even throw in a switch.

**Uniform ringing current.**

The source of energy—the storage battery—is maintained at constant voltage, insuring a ringing current without fluctuations.

**Dependable charging equipment.**

Mechanical rectifiers are used in duplicate. Either one or both may be in use at one time.

**Low cost of operation.**

The amount of current consumed is very low because the no load losses have been reduced to a minimum.

**Supplies Talking Battery.**

Current from storage battery is used on switchboard transmitters at a cost of 20c or less a month.

**New circulars on Ringing machines will be off the press in a few days. Write for yours now.**

## LEICH ELECTRIC CO.

**Telephones, Switchboards, Accessories**

## GENOA, ILLINOIS

**DISTRIBUTORS**

**ELECTRIC APPLIANCE COMPANY**
Chicago, Dallas, San Francisco, New Orleans

**TELEPHONE & ELECTRIC SUPPLY CO.**
Spokane, Wash.

**ST. PAUL ELECTRIC CO.**
St. Paul, Minn.

**B-R ELECTRIC COMPANY**
Kansas City, Mo.

**POST GLOVER ELECTRIC CO., Cincinnati, Ohio**

# Telephony.

THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Telephone Weekly, Telephone Magazine, Telephone Securities, The Telephone, Sound Waves

PUBLISHED WEEKLY BY TELEPHONY PUBLISHING CORP.
116 S. Michigan Ave., Chicago

H. D. FARGO, President and Treasurer.
G. M. ALLEN, Mgr., Copy Dept.
S. R. EDWARDS, Editor and Secretary
J. R. HASTIE, Vice-President and Advertising Manager.
H. D. FARGO, Jr., Western Advertising Manager.

Entered as second-class matter September 4, 1908, at the post office at Chicago, Ill., under act of March 3, 1879.

Volume 82
Number 22

CHICAGO, SATURDAY, JUNE 3, 1922

Subscription—10 Cents a Copy
$3 a Year U. S., Cuba and Mexico
$4 Canada, $5 Other Countries


## CURRENT OPINIONS AND COMMENTS

The other day calls went out from Washington to the steel executives and rail heads bidding them to dine with the President.

While the purposes of the invitations were not given out, it was generally understood that President Harding had decided to confer informally with the various groups of business executives of the country to see what can be done in solving the problems that lie before us, and are holding back a return to normalcy.

In other words, President Harding, a believer in cordial co-operation and getting together, is passing out the idea of "Sit down and let us reason together. Stop making faces at one another. We can accomplish something by discussing frankly and freely our problems."

* * * *

Resulting from these co-operative conferences, it is stated that the steel executives all favored the abolition of the 12-hour day and will investigate to see if it can be done.

The railroad presidents voiced a unanimous desire to make the fullest possible contribution to restore and maintain prosperity. They have appointed a committee to co-operate with the Interstate Commerce Commission and to see what can be done to make possible railroad rate reductions.

* * * *

This idea of sitting down together and reasoning a thing out is not a new one. Many are the instances that can be cited in the telephone field in support of it.

These are found in the records of some Bell companies in their dealings with the Independents—some of the Bell presidents never had "destructive" competition in their territory because of "sitting down and reasoning together."

The records of the state utility commissions as regards "informal" complaints—notably in Massachusetts—furnish strong evidence that cordial co-operative reasoning produces quicker, greater, and more permanent results than the destructive fighting and opposition tactics.

* * * *

The telephone business is a young people's business. Look around your plant and see if the greater proportion of employes are not to be classed as "young."

And that is one reason why the savings plan inaugurated by the United Telephone Co., Abilene, Kans., whereby each employe is required to save 10 per cent of his income is of particular interest. "In the time of plenty, prepare for the time of need" is a proverb which has special reference to youth. Then is when persons are most likely to spend freely—and possibly foolishly. So youth is the time to cultivate thrift.

* * * *

The United Telephone Co. argues that it can not afford to have people in its employ who are not thrifty, for if they are careless with their own affairs, they will be careless with those of their employers.

The company sets up a reserve for depreciation. Its employes whose services it rents, should be as thoughtful and set up a reserve for depreciation—a savings account of some kind that will grow and increase for the day when their services will no longer be of any considerable money value.

Many favorable comments have been made regarding this new plan of requiring thrift. It is certainly a plan that should work out well for both employe and employer.

* * * *

That series of operators' schools in Iowa is doing much in the way of developing cordial co-operation and interest in operating work. And there's nothing like getting acquainted to develop co-operation.

TELEPHONY has published some of the papers prepared by operators and read at these meetings—and they show that operators are thinking about their work and taking a greater interest in it than ever before. And that means better telephone service.

* * * *

Speaking of operators' schools, we had a letter the other day from a chief operator of a good sized Independent telephone exchange, in which reference was made to the needs of chief operators.

"What the Independent telephone companies in this state need," she wrote, "is a convention for their chief operators to get together and talk over the traffic end of telephone work. Get new ideas, discuss different methods, etc.

"We, as chief operators, need to know something more than just how to teach an operator how to say 'Number, please?'"

There's a good suggestion for officers of the state associations to consider when they begin to plan for their annual meeting. Many chief operators have attended state conventions, but there has never been any effort made to hold a meeting for the discussion of the traffic problems of the chief operators.

At the national convention in Chicago last fall a number of chief operators were present, but outside of the exhibits, there was no program of interest to them.

The women take just as much interest in telephone work as the men—and in many cases know more about the actual details—so why not, at some of the meetings of state or national associations, try a program that will have an intimate interest for chief operators?

Managers have discovered the value of operators' schools and undoubtedly would see that their chief operators attend such a meeting. And all this is along the line of "Greater Service."

* * * *

"Greater Service" must be the slogan of every business and every individual of the nation, if the country is again to strike its stride and advance as rapidly as it did in the prewar period, Martin J. Insull, vice-president of the Middle-West Utilities Co., of Chicago, told the National Electric Light Association at its recent convention held at Atlantic City.

"It is the idea of 'Greater Service' which made this nation great," Mr. Insull said. "It was the feeling of the individual that he should give just a little more in the way of goods or service which made all kinds of business try to outstrip competitors. The reward for success which came through the effort was a stimulus to greater invention, greater development of our natural resources and development of the individual regardless of his employment capacity.

"Employes of electric light and power, gas, telephone and electric railway companies, by and large, have been conceded to be courteous—but we must help them to become more courteous and more efficient. The progress which the light, heat, power, transportation and communication service will make depends almost wholly upon the personal service each employe gives to those with whom he comes in contact. Those workers who show the greatest appreciation of rendering service are those who will grasp the opportunities and advance most rapidly.

* * * *

"The development of the utility services for the nation's people is still in its babyhood. Marvelous as we regard these agencies today, they are but small as compared with what they will be 10 or 20 years from now.

"The question of maintaining personal contact with our customers, so that they may obtain the little niceties of service which we desire them to have—and which we must render if we are to do our full duty and grow to our fullest—becomes more difficult as service expands. It is because of this that it is obligatory that executives educate and guide their employes to the end that each worker may become more fully informed respecting his business so that at all times he may be a real representative of his company.

"The utilities, great as have been their accomplishments and remarkable as are the services they render, still are not super-human agencies which can never go wrong. And governed as they are by the human element, and because of their intimate relationship to the every-day life of every man, woman and child, it is all the more reason that 'Greater Service' be constantly the watchword so that the industry may play its full part in the nation's development, its employes and patrons may be more fully satisfied, and that it may earn the reward that finally comes to all who make honest and constant effort for the public good."

So there you are. Every meeting or conference which promotes the idea of greater service will help pay dividends to the utility. And meetings of chief operators at state or national conventions, will undoubtedly make for "Greater Service."

# Application of Telephone Repeater

## Technical Difficulties in Way of General Use of Telephone Repeater—The Need for Large Amount of Auxiliary Apparatus—Interesting Examples of The Repeater's Use—Address Before the Western Society of Engineers

By H. S. Osborn

*Transmission Engineer, American Telephone & Telegraph Co.*

The fundamental source of energy with which we are concerned in telephony is the acoustic energy which is produced by a man when he speaks. This varies greatly in amount from one instant to another, depending upon what syllable is being uttered, but on the average it amounts to the order of 1/10,000 of a watt; that is, if you convert into heat the energy represented by the sound waves which issue from a man's mouth, when he is talking, you find it is that order of magnitude.

It is so small that we ordinarily speak of it in terms of microwatts, a microwatt being 1/1,000,000 of a watt. So this acoustic energy with which the telephone is dealing is about a hundred microwatts.

Now, in order for a man to hear easily his ear must receive in the order of a fraction of a microwatt. That means that there must be put into a telephone receiver, in order to give good, intelligible speech, about ten microwatts of energy, so that the energy delivered by the telephone line to receiver must be that order of magnitude.

These figures do not give a very big ratio for the energy which may be lost in the transmitter and the telephone circuit. Fortunately the modern telephone transmitter has an efficiency of about 10,000 per cent. It delivers to the telephone line about a hundred times as much energy in the form of telephone current as it receives from the voice of the man speaking into it. This comes about, of course, through the fact that the transmitter uses the very feeble acoustic energy of the voice to control electric energy received from a battery, and the alternating currents which result and which are delivered to the telephone line represent about 10,000 microwatts.

As a result, it works out that in a well designed telephone line the loss from the transmitter to the receiver at the distant end can be about 99.9 per cent; that is, about one-tenth of 1 per cent of the input energy must be received at the end of the telephone line. The exact amount which is required varies with different conditions. Sometimes it has to be as high as 1 per cent.

Over ordinary telephone circuits—for example, between two cities that are connected by an ordinary open wire telephone line—that amount of loss of energy makes it possible to talk over distance of about 200 miles, including the losses in the small gauge cable conductors inside the cities and the losses in an ordinary open-wire telephone line between the two cities. If it is desired to talk farther than that some means has to be found to increase the energy which is received at the receiving end.

Straightway you may think of three ways by which that could be done: One might conceivably increase the power of the transmitter so that more power is sent into the sending end of the line, or one might improve the efficiency of the circuit so that the losses per unit length are not as great, or thirdly, one might place in the line at intervals some machine for renewing the energy so that a small input of energy to this machine will result in a large output of energy transmitted over the next section of the line. This third method is the method of the telephone repeater.

The method of increasing the distance of transmission by increasing the power of the transmitters has very narrow limitations. There has been a continued research on transmitters for the last 30 or 40 years and very great improvements have been made. Even further improvements are to be expected. However, the loss of energy in a telephone line increases in accordance with an exponential law, so that any conceivable increase in the power of transmitters cannot materially affect the problem of giving long distance transmission.

The efficiency of the telephone lines can be improved by making the lines of bigger copper, but as one increases the investment in copper, the expense of the lines goes up at a rapid rate, compared with the increase in efficiency. So that method has very narrow limitations. There is another method of improving the efficiency of lines, which is in very general use in telephony, namely, "loading." Loading is the telephone equivalent of high potential transmission in a power line. It is the means by which it is possible to raise the voltage of a telephone toll circuit. However, the technical limitations of loading are such that the voltage can only be approximately doubled and the line losses per unit length reduced to about a third of what they are without loading, so that the gain in transmission, which can be brought about by loading is limited.

For a good many years it has been recognized by telephone men that the telephone repeater was for many conditions an ideal method of attack for the problem of long distance telephony, and telephone repeaters of limited efficiency have been used in a limited way for nearly 20 years. The reason that heretofore there has not been a more general use of the repeaters is because of the fact that their use is accompanied with very serious technical difficulties which had to be overcome before they could become very generally of value and I shall want, first of all, to point out the two most important of those technical difficulties.

Fig. 1 is a photograph of telephone currents. The telephone currents have to represent very closely in wave shape the shape of the acoustic waves which are produced when a person speaks. This photograph, taking all three sections together, constitutes a picture of the word "America." You see that the first syllable, *A*, constitutes a very complicated but characteristic oscillation. The oscillations are purposely crowded together very closely in the picture, so that we would be able to get the whole word in it.

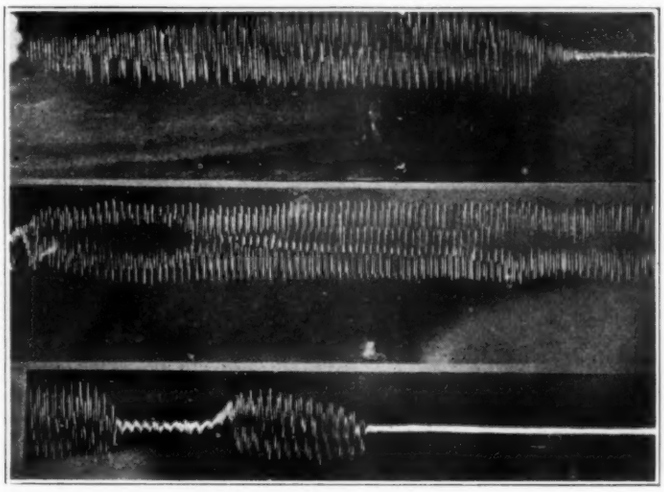


**Fig. 1. Oscillograph Record of the Word "America," Upper Section Being the Syllable "A," the Middle Section "Meri" and the Lower Section "Ca."**

There is a brief interval between the two syllables. Then follows the syllable "Meri" which constitutes the entire middle section, a complicated oscillation which changes continuously in its form. About all you can see are the white specks which indicate the ends of the travel of the oscillograph, which vibrates for each part of the oscillation. After the "meri" comes a third syllable "ca," starting with a very complicated oscillation, very difficult to see in the picture, and gradually transforming into the vowel similar to that at the start.

A telephone repeater must reproduce with extreme fidelity the form of those oscillations and it must be borne in mind that this whole picture of three sections occupies a little bit less than a second when the word is spoken. It is an interesting fact that ordinary speech consists of a series of bunches of oscillations with quiet periods between them. The telephone apparatus including the telephone repeater must be so constructed that it will faithfully reproduce these oscillations—that it will start up quickly and stop very promptly with the oscillations which are being reproduced.

It has been pointed out that the telephone transmitter is itself an amplifier. It receives about a 100 microwatts of ordinary acoustic energy and delivers to the telephone line about a hundred times as much energy in the form of telephone currents. It is very natural, therefore, that the first attempts at development of a telephone repeater should be along lines similar to the transmitter, using a mechanism like the transmitter, driven electromagnetically, instead of by acoustic waves, and having it reproduce through the action of a carbon button electric waves of greater amplitude. This problem was studied very intensively and as a result an amplifier of this type, of great refinement, was developed.

The earlier telephone repeaters were of what is known as the mechanical type. The vibrating element is a little disk with a small plunger attached to it. It is firmly encased in an iron casting, and surrounded by an exceedingly efficient magnetic circuit. This apparatus is quite successful and is still in commercial use, giving satisfactory results. It is subject to severe limitations, however, because of the fact that it can not reproduce the voice currents with perfect fidelity.

The apparatus depends upon the vibration of mechanical parts and although those parts constitute a very light plunger and diaphragm, weighing in all only a few grams, they are not able to follow the rapid oscillations of speech currents with perfect fidelity. The amount of distortion which is produced by them in voice currents is, therefore, important in some cases, particularly where a large number of these machines would have to be used in tandem in a long circuit.

For a more perfect device, therefore, we have to turn to an instrument in which the moving parts are smaller and lighter. That instrument has been found, as you probably all know, in the vacuum tube. Fig. 2 shows a vacuum tube of the type in common use for telephone repeaters. It is about the size of a small electric lamp. The glass bulb is evacuated to the highest degree of vacuum which science can attain.

The bulb contains three elements, a fila-

ment in the middle, which is V-shaped, made up of twisted wire and which, when the tube is operating, is heated to a dull red heat; a grid of wires on either side of the filament connected together; and outside of the grid, two plates which are also electrically connected together.

Fig. 3 shows a vacuum tube in diagram for the purpose of making it easier to explain the method of operation.

The action of the vacuum tube rests upon two very important discoveries. The first discovery, made by Mr. Edison a good many years ago, was this: that, if in a highly evacuated vessel of this sort, with red hot filament, a voltage were applied between the plate and the filament, a current would flow across from the filament to the plate, provided the positive pole of the battery were connected to the plate. That current consists of electrons which are emitted from the filament, and which are caused by the attraction of the positive plate to flow from the filament to the plate.

The other discovery was made by Dr. DeForest—that if a grid of wires were interposed between the filament and the plate, the flow of current between filament and plate was very greatly influenced by any potential which is established between the filament and the grid. Following up these discoveries, as the result of several years' very intensive research work, the vacuum tube in its present form was developed with characteristics suitable for telephony.

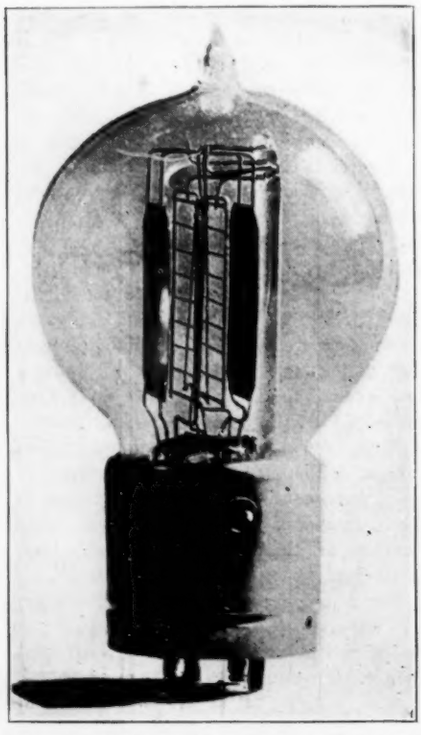


**Fig. 2. Modern Type of Vacuum Tube Amplifier Used in Telephone Repeaters.**

The operation is this: The telephone currents to be amplified are caused to produce a voltage between the filament and the grid, using a transformer. The variations in the voltage between the filament and the grid cause fluctuations in the current flowing from the filament to the plates on either side, and those fluctuations in current are transmitted to the other telephone line in which amplified currents are desired. The amount of energy represented by those fluctuations in the output are as much as a hundred times as great as the energy of the input current and sometimes even more.

The only moving parts in this machine are the electrons themselves. These electrons are exceedingly light, being about 1/1700 of the weight of an atom of hydrogen. They are able to reproduce very faithfully the variations of the incoming current.

The vacuum tube practically solves the first difficulty—that is, the difficulty of reproducing faithfully the very complicated oscillations of the telephone current—and solves it so well that in spite of the necessity of associating the vacuum tube with a great deal of auxiliary apparatus in practical work, the difficulty can be said to be substantially overcome as regards our practical problems at present.

The second major difficulty is one which arises from the fact that a telephone line must transmit conversations in both directions, and the repeater element as shown here is essentially a one-way device; that is, telephone currents coming in from one section of line are amplified and sent out on the other section. The telephone currents coming in the other direction are not amplified and cannot get past the device.

It is necessary, therefore, in making practical use of the telephone repeater, to associate it with other apparatus which will permit conversation in both directions. In pointing out the difficulty in doing this I have thought it might help clarify the matter to make use of a hydraulic analogy.

Suppose we have a pump in which variations in pressure of water from the East pipeline operate a side valve which controls a steam cylinder and transmits corresponding variations in pressure to the West pipe line. The pump should not be thought of as pumping a continuous stream of water, but as pumping water first in one direction and then the other. You will see that this is analogous to the one-way telephone repeater, variations in pressure in the East pipe line being reproduced in an amplified way in the West pipe line.

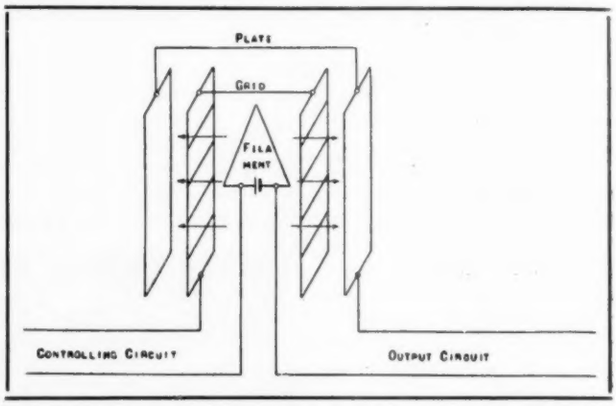



**Fig. 3. Diagram of Connections of a Vacuum Tube Amplifier.**

Perhaps the first thing that would occur to any one in making possible operation in two directions is to put together two of these machines, pointed in opposite directions—and that is what has been done. Pressure coming in from the East will operate its pump and cause pressure to be applied to the West pipe line, but as soon as that pressure is applied to the West pipe line that pressure of itself operates the other pump and produces pressure on the East pipe line, which again operates the first pump, so that both pumps are kept continually in the position of producing pressure on the pipe lines, and they are not open to any influence from outside. In other words, the device is completely inoperative.

In order that the thing may be operated, it is very evident that some scheme must be worked out whereby the large pressure produced by the East pump under the influence of slight pressure from the East will not in any way affect the valve which operates the West pump, so that this pump can operate without affecting the West pump, and then, when the pressure comes in from the West, that can operate without influencing the East pump.

A way in which that can be done is by the use of a properly-designed balancing device having a chamber connected to a balanced valve. On one side of the chamber is connected the West pipe line and on the other side a device which we have called a balancing pipe line. If one can build some sort of device so that the same resistance to flow is produced at every instant of time by the actual pipe line and by the balancing pipe line, the pressure on the two sides of the balanced valve will always be the same and the West pump will not be influenced at all by the operations of the East pump.

On the other hand, when variations of pressure come in from the West pipe line, they operate the valve and cause the pump to operate and supply pressure to the East pipeline.

That arrangement is roughly analogous to the type of circuit which is ordinarily used for connecting telephone repeaters

to the telephone lines. A diagram of that circuit is shown in Fig. 4. One of the repeater elements is actuated by currents flowing in from the East line, the output of that repeater is transferred to the line by means of a transformer having carefully balanced windings, and to one set of windings is connected the line West; to the other set of windings is connected a balancing line.

If the line is properly balanced, the output currents flow to the line and to the balancing line without producing any voltage on the input of the other repeater element, which is used for amplifying the currents coming in from the line West. The requirement of balance between line and balancing network goes into the construction of the telephone lines throughout their entire length and to the apparatus connected at their terminals.

In order to obtain a balance in the currents flowing to the line West and to the balancing line for every minute instant of time under conditions of very complicated electrical oscillations, it is necessary that very strict limits be placed on the construction of the telephone line with which the repeater is used, so that things which were good practice in telephone lines not used with repeaters are inadmissible if the telephone line is to be used with repeaters. It also places strict limits on the maintenance of the telephone circuits.

These requirements in many cases have evolved a considerable degree of reconstruction of telephone circuits before telephone repeaters could be used in connection with them. The determination of just what these limitations are on the construction of the lines, and how to live up to them economically has been one of the very large problems involved in the practical use of telephone repeaters.

Referring again to the hydraulic analogy, we might get an operating condition by having two pipe lines, one to pump in one direction and the other to pump in the other direction, connecting them together only at the terminals. That is what is done in a type of telephone circuit having a very important use, called a four-wire circuit. A circuit of this type is shown diagrammatically in Fig. 5.

One pair of wires is used for operation in one direction only, putting in the circuit one-way repeaters, and another pair of wires for talking in the opposite direction only. The two circuits have to be connected together at the terminals, and we still have the necessity for meeting the balance requirement at the terminals of the circuit, but we have gotten away from the necessity of balance at all the intermediate points.

Of course, this has been done at the sacrifice of using two pairs instead of one, but under some conditions it is economical to do that, the gain which is obtained by avoiding the limitations due to balance being sufficiently great to more than offset the additional cost of another pair of wires.

Another requirement which has to be met by telephone repeaters for practical use is the requirement that they shall not interfere with ringing or other form of signaling over the telephone lines—that is, with the means by which one operator calls another operator at the other end of the line.

Take it all in all, these requirements lead to a large amount of auxiliary apparatus in the use of telephone repeaters, so that the repeater element itself is a very small part of the whole thing.

Turning now to specific instances of the application of repeaters, I would like to mention, first, the transcontinental circuit, which was opened in 1915. There is set up all the time a direct telephone circuit from Chicago to San Francisco. That circuit connects at Chicago to direct circuits to New York, Philadelphia, Boston, and other Eastern points, and at San Francisco to circuits running up and down the Pacific Coast.

The circuit from Chicago to San Francisco has telephone repeaters at Davenport, Iowa; Omaha, and North Platte, Neb.; Denver, Colo.; Rawlings, Wyo.; Salt Lake City, Utah; Winnemucca, Nev., and Sacramento, Calif.—eight all together.

Let us try to picture the energy at different parts of a Chicago-San Francisco telephone circuit. Assuming that a subscriber is talking at Chicago, and that his telephone is connected directly to the end of the toll line, we would have at Chicago about 10,000 microwatts of electrical power flowing in the circuit. At Davenport, Iowa, the power has been reduced to a little over 1,000 microwatts but the repeater there amplifies it to 8,000 microwatts.

The line losses between Davenport and Omaha reduce the power to about 500 microwatts. There it is amplified again. The process is repeated by successive steps, until at San Francisco there are left 365 microwatts, or roughly, 1/30th of the electric power which was put into the circuit at the Chicago end. That corresponds to a very high grade telephone circuit for that distance.

If, instead of using repeaters, we were to attempt to do the same thing by using larger conductors, it would mean conductors so large that the energy curve would fall off gradually from 10,000 microwatts at one end to 365 microwatts at the other end. This would mean that the telephone conductors would have to weigh about 25,000 pounds per pair of conductors per mile, as contrasted with 870 pounds, which is the weight of the circuit actually in use. You can readily see that while, as a technical possibility, a circuit of that degree of efficiency could be built, no one could afford to pay for talking over it—that is, the scheme would not be commercially possible.

If we were to attempt to get the results by using more powerful transmitters at Chicago, what would they be? Translated into terms of power, it means that at Chicago the telephone transmitter would have to deliver to the line about 2,000 kilowatts of energy in the form of telephone currents, which is, of course, a sufficiently radical figure to make very striking the impossibility of achieving these results by loud speaking transmitters.

Another interesting example of the use of telephone repeaters is in connection with the Boston-Washington cable. This

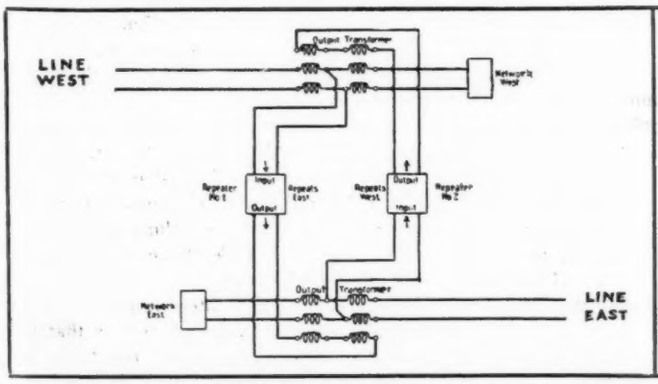



Fig. 4. Circuits and Arrangement of Repeaters Showing Method of Balancing Lines.

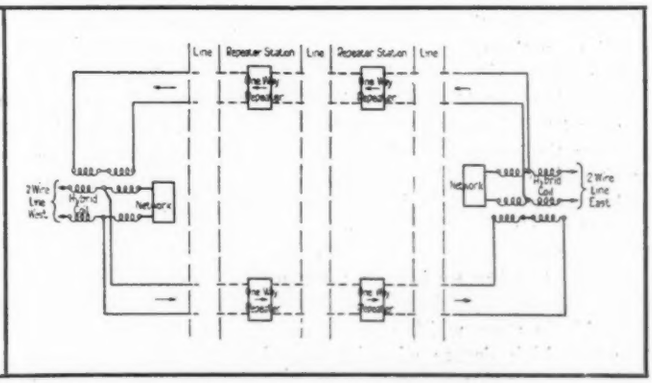



Fig. 5. Diagram of a Four-Wire Long Distance Telephone Circuit Using Repeaters at Intermediate Points.

cable was put into service in 1914, before repeaters were fully developed, and was used for a service between large cities on the Atlantic Seaboard. It is underground throughout and provides a line of communication which is extraordinarily free from any possibility of interruption. Further cables have been pulled in on this route since the original cable, using small conductors, because of the possibility of using repeaters. Repeaters are used throughout the length of the cable at a large number of repeater stations.

One of the recent applications of telephone repeaters is in connection with the establishment of telephone communication between the United States and Cuba by means of telephone cables placed across the Florida straits. The technical problems involved in this project make a complete story in themselves, so I cannot dwell upon them.

The distance between Key West and Havana is about 115 miles and the water is over 6,000 feet deep. The cables laid between those points are the longest submarine telephone cables ever constructed, and they are placed in by far the deepest water in which telephone cables have been operated.

The depth of water is a very important matter, because it affected the design of the cable in ways which made it difficult to get a high degree of efficiency. Instead of using dry paper for the insulation, as is common with telephone cables, it was necessary to use gutta percha, the only type of insulation which is known to endure under the heavy pressures of that depth of 6,000 feet.

The losses of energy in the gutta percha insulation are very much higher than in paper. Furthermore, in order to design the cable to be efficient, a fairly large conductor was used—300 pounds per mile—and the completed cable was so heavy that the heaviest cable-laying apparatus which has yet been built would not be able to handle a multi-conductor cable. It was necessary, therefore, to use single conductor cables, operating with one insulated conductor, and return through the sea water.

Such a case introduces difficulties in the use of repeaters from the fact that, of course, they can be applied only at the terminals of the cable. We should like to place a repeater in the middle somewhere, but obviously it was impossible. As a result of careful study and a great deal of technical work in the design of the cable and designing special repeaters which are operated at both ends of the cable, very satisfactory results have been obtained.

The ratio of energy between the two ends of the cable without repeaters would be about 700 to 1—that is, one would get at Havana 1/700th of the energy which was put in at the Key West end. With repeaters, the ratio is only six to one, so that by getting down to Key West something on the order of a few per cent of the energy with which the telephone line was supplied at the distant station in the United States, good telephone transmission is obtained in Havana. The operation of the cable has been very satisfactory, but without repeaters it would not have been possible to build and lay cables which would have given satisfactory results.

There is one other very important development in long distance telephony which depends on the use of vacuum tube amplifiers, which I want to describe to you simply to the extent necessary to show that dependence. I refer to the use of carrier current telephone systems by which it is possible to superpose a number of independent telephone circuits on the same pair of wires. There are a number of problems involved in providing satisfactory carrier current transmission and I have not time to go into all of them.

Carrier current telephony depends on the use of high frequency currents. We are using currents as high as 30,000 cycles in frequency. The losses of energy at those high frequencies are relatively very great. The losses increase rapidly as the frequency is raised. Therefore, carrier current telephony was wholly impractical before the perfection of the vacuum tube repeater, and although it had been in the minds of telephone men and in the hopes of inventors for a long while before, it was not possible to use it practically until the vacuum tube repeater became a reality.

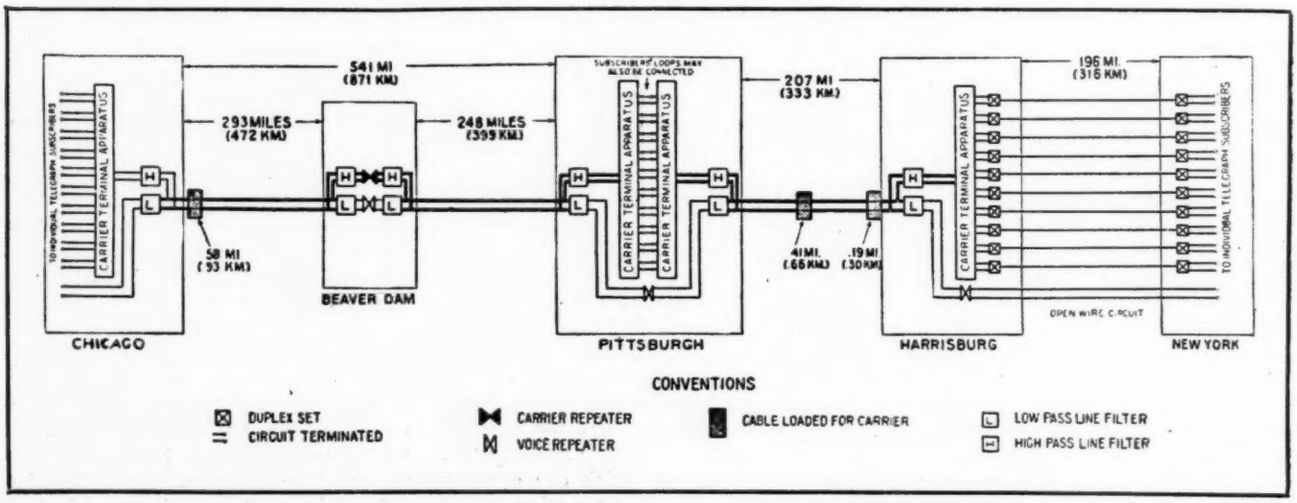



**Fig. 6. Diagram of Connections of the Carrier Telephone Circuit between Harrisburg and Chicago by Means of Which a Number of Independent Conversations May Be Carried Over the Same Pair of Wires Without Interference.**

That is pretty well illustrated by the schematic diagram given in Fig. 6 of a carrier telephone circuit between Chicago and Harrisburg. It terminates at Harrisburg, because from Harrisburg there are cable facilities which carry the circuits the rest of the way to New York. From Harrisburg to Chicago there are four high-frequency carrier-current channels superposed on the ordinary low frequency channel and the route of the high frequency current is shown by the heavy lines on the diagram.

The double triangles are carrier repeaters and it will be noted that the losses in energy are so rapid that in the distance from Harrisburg to Chicago it is necessary to install four of those carrier-current repeaters in order to renew the rapidly attenuated energy.

One exceedingly interesting feature of those carrier-current repeaters is that the same piece of apparatus, even the same repeater blubs, amplifies all four of the carrier-current circuits together. The high-frequency currents corresponding to the four circuits are put together into one circuit at Harrisburg and they are not unscrambled at the repeater points, but all go together through the repeater bulbs. The amount of apparatus required for one of these carrier-current repeaters is somewhat greater than for an ordinary telephone repeater.

The growth of carrier current systems which have been made possible by repeaters is quite extended as there are carrier-current routes now in service between Chi-

cago and the Atlantic seaboard—telephone from Harrisburg to Chicago, telephone from Harrisburg to Detroit, and telephone from Baltimore to Pittsburgh; telegraph from Harrisburg to Chicago. In addition to this, we have telegraph from Washington south to Atlanta, telephone from Boston north to Bangor, telegraph from Chicago west to the Pacific Coast, and carrier telephone and telegraph up and down the length of the Pacific Coast.

In connection with the opening of service between the United States and Cuba in April of this year, a demonstration was given of conversation over what is the longest telephone circuit ever established in the world, and illustrates in a striking way what it has been possible to accomplish by telephone repeaters. In this connection the circuit was established from Havana up the Atlantic seaboard to New York, across to San Francisco, down the Pacific Coast to Los Angeles, and out to Catalina Island.

In that connection, which was approximately 5,600 miles long, all kinds of transmission circuits are represented: Transmission under the sea to the greatest depth ever attained by telephone cables between Havana and Key West; overland lines across the country and up and down the coast; and transmission by wireless telephone between Los Angeles and Catalina Island, which is about 30 miles off the Pacific Coast.

In establishing the circuit for the demonstration, Colonel Carty called the roll of places at which telephone repeaters were located. One by one the men in charge of those repeater stations answered, giving a very impressive picture of the length of the circuit: Havana; Key West, Florida; then West Palm Beach and Jacksonville; then Denmark, S. C.; then Selma, N. C.; Richmond, Va.; Philadelphia; New York; Harrisburg; Pittsburgh; Beaver Dam, Ohio; Chicago; Davenport, Iowa; Omaha; North Platte, Neb.; Denver, Colo.; Rawlings, Wyo.; Salt Lake City; Winnemucca, Nev.; Sacramento; San Francisco; Fresno, Cal.; Los Angeles, and finally Catalina Island; and then Catalina Island talked over that circuit with Havana.

It is a very striking achievement of the use of repeaters that this conversation could take place. It seems all the more marvelous, I think, when we realize that the transmission of the voice from one end to another of that circuit required only a tenth of a second, whereas if it were to be transmitted through the air it would take seven hours.

As a final illustration of what can be done with telephone repeaters is the project of giving service by cable all the way between New York and Chicago. The cable is now complete and in service as far as Pittsburgh. Plans are now under way for extending it very shortly to Cleveland and within a few years it is expected to be through to Chicago. The cost of the entire project per mile is about the same as that of a railroad.

The use of very long cables for toll service has been made possible by repeaters. The loss of energy in the cable circuits is very much greater per unit length than in open-wire circuits, in which the conductors are separated from each other by a greater spacing with correspondingly lower losses.

One of the striking features of the very long toll cables is the use of very small conductors for the very long distances, with amplifiers at intervals of about 50 miles. New York-Chicago service will be given by two pairs of conductors, using the four-wire circuit, the two pairs totaling 80 pounds to the circuit mile in place of 870 pounds, which is now used for New York-Chicago service.

As one of these cables contains, inside of a sheath of about 2½ inches in diameter, 200 telephone circuits or more, and repeater stations have to be spaced at about 50-mile intervals, it has been worth while to do a good deal of work in developing more exact and more economical forms of telephone repeaters. Fig. 7 illustrates a type of repeater used on this cable.

These particular repeaters are in use at Reading, Pa., where the whole thing is very greatly concentrated, as compared with the previous types which have been shown to you. Fig. 8 is another photograph at Reading, showing a bank of repeaters. The repeaters visible in that one photograph are sufficient to supply 33 four-wire telephone circuits, so that you can see there has been a great deal of work done in condensing the space required.

I wish that it were possible in some way

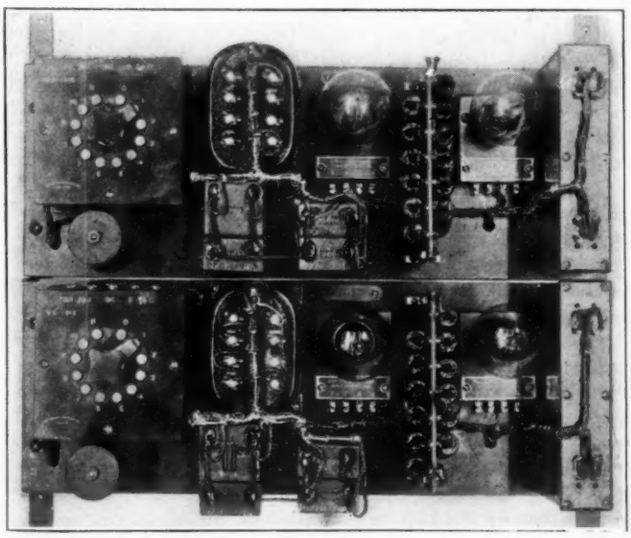


Fig. 7. Details of the Type of Repeater Used in Modern Cable Circuit.

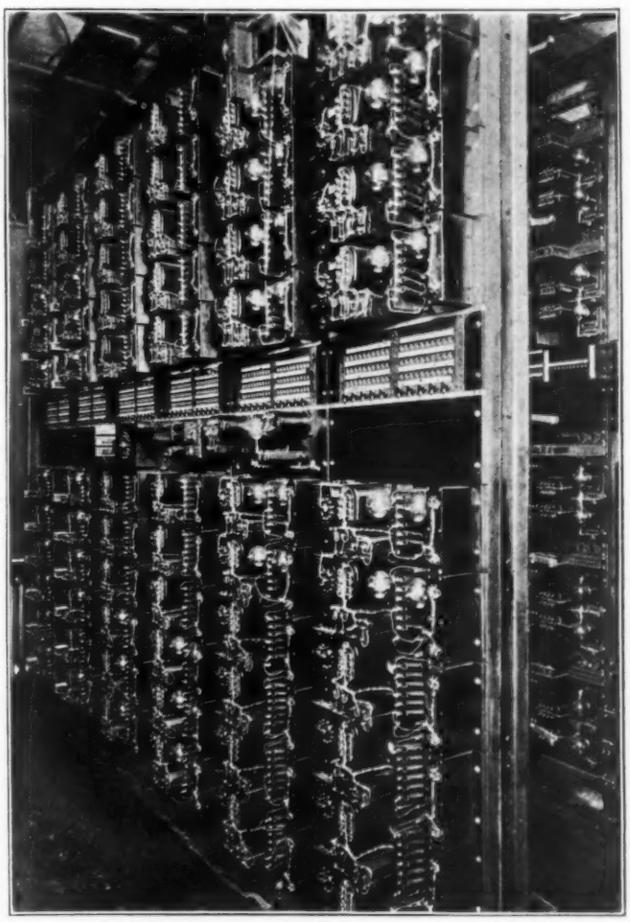


Fig. 8. A Repeater Installation at Reading, Pa. This Rack Contains the Repeaters for 33 Circuits.

to paint a vivid picture of the amount of amplification in a New York-Chicago cable circuit. I have tried to get at it a little bit by preparing some figures of the amount of energy which would have to be transmitted in a cable circuit if repeaters were not used.

At Chicago we have, let us say, about 300 microwatts of energy received. If there were no repeaters, in order to deliver that energy at Chicago we would have to have at South Bend energy sufficient to light a 50-candle power lamp. It has been estimated that the total mechanical and electrical energy which is developed in the world is sufficient to light about 20,000,000,000 electric lamps, taking the world over, including steam power, hydraulic power, all forms of mechanically generated power. We would have to have that amount of power flowing in the circuit at Sandusky in order to maintain the power delivered at Chicago.

However, this total mechanically generated power is only about 1/200,000 of the power which is received by the earth from the sun by the radiation which falls on the earth, and we would have to have in the circuit the total energy received by the earth from the sun at a point a little bit beyond Cleveland. The earth occupies only a very minute speck in the space around the sun and, in consequence, it only receives about 1/2,000,000,000 of the total energy which the sun radiates into space. We would have to have, however, all of the energy which the sun radiates into space at a point a little bit beyond Pittsburgh. By the time we get to Harrisburg, we would have to have the energy of a thousand million suns. And I am afraid that there are not enough suns in the whole cosmic sphere to take us to New York.

Only a few of the more striking examples of the use of telephone repeaters in commercial telephone service have been pointed out. The use is very general, however, throughout the country. The number of repeaters now in service runs into the thousands and the number is rapidly increasing.

The telephone repeater is not the work of any individual. It is not the result of a single invention. It is the result of the combined efforts of a very large number of men working in different parts of the telephone organization, men doing inventing work, scientific research, practical engineering work, and the men who design and build and maintain the telephone plants all are involved in the work of practically developing and using telephone repeaters.

The marvelous results which have been obtained are not due either to the discovery of any new materials or any new laws of physics. The materials have been present ever since the world was created. It is an example of what is done by the co-operative effort of human minds working together in the solution of a great problem and the triumph of the telephone repeater is not the triumph of steel, iron or copper, or even of a vacuum. It is the triumph of the human brain when working with other human brains towards the solution of a difficult problem.

# Radio Installation Rule Revision

## Tentative Rules for Installation of Radio Equipment Prepared by Special Committee of National Fire Protection Association—Proposed Revision of Rule 86, National Electric Code, with Discussion by Bureau of Standards

In order that the National Electrical Code may be kept abreast of the latest developments in electrical science, in its more practical aspects, it is habitually revised at two-year intervals. With the spreading popularity, however, of the radiophone, it was deemed necessary to revise that part of the code which relates to receiving and sending apparatus and to make public the amendments at once to meet the emergency that has arisen.

These revisions, it should be said, are in themselves tentative and subject to possible further emendation before they are incorporated in the 1923 edition of the code. Suggestions for improvements in these proposed rules should be sent to William S. Boyd, chairman, of the committee on signal systems, wireless and lighting, 175 West Jackson boulevard, Chicago, not later than September 1, 1922.

The specifications that follow were drawn up by a special committee of the National Fire Protection Association, whose findings are viewed as standards of engineering practice. Besides the underwriting organizations represented upon this body, engineers acting for the American Radio Relay League, American Telephone & Telegraph Co., Radio Corp. of America, and the U. S. Independent Telephone Association participated.

It should be noted at once that this committee places itself on record as considering receiving stations making use of an *indoor* antenna devoid of hazard. With any receiving set the principal danger comes from lightning brought in over the antennae to the equipment, or to some part of the building. Where there is no exterior antenna, this hazard is removed.

As telephone men are primarily interested in receiving equipment installations, only that part of the specifications is published.

The following requirements are submitted as proposed revisions of Rule 86 National Electrical Code:

In setting up radio equipment, all wiring pertaining thereto must conform to the general requirements of this code for the class of work installed and the following additional specifications:

For receiving stations only.

**Antenna.**

a. Antennas outside of buildings shall not cross over or under electric light or power wires of any circuit of more than 600 volts or railway trolly or feeder wires, nor shall it be so located that a failure of either antenna or of the above-mentioned electric light or power wires can result in a contact between the antenna and such electric light or power wires.

Antennas shall be constructed and installed in a strong and durable manner and shall be so located as to prevent accidental contact with light and power wires by sagging or swinging.

Splices and joints in the antenna span, unless made with approved clamps or splicing devices, shall be soldered.

Antennas installed inside of buildings are not covered by the above specifications.

**Lead-in Wires.**

b. Lead-in wires shall be of copper, approved copper-clad steel, or other approved metal which will not corrode excessively and in no case shall they be smaller than No. 14 B. & S. gage except that approved copper-clad steel not less than No. 17 B. & S. gage may be used.

Lead-in wires on the outside of buildings, shall not come nearer than four inches to electric light and power wires unless separated therefrom by a continuous and firmly-fixed non-conductor that will maintain permanent separation. The non-conductor shall be in addition to any insulation on the wire.

Lead-in wires shall enter building through a non-combustible, non-absorptive insulating bushing.

**Protective Device.**

c. Each lead-in wire shall be provided with an approved protective device properly connected and located (inside or outside the building) as near as practicable to the point where the wire enters the building. The protector shall not be placed in the immediate vicinity of easily ignitable stuff, or where exposed to inflammable gases or dust or flyings of combustible materials.

The protective device shall be an ap-

proved lightning arrester which will operate at a potential of 500 volts or less.

The use of an antenna grounding switch is desirable, but does not obviate the necessity for the approved protective device required in this section. The antenna grounding switch if installed shall, in its closed position, form a shunt around the protective device.

**Protective Ground Wire.**

d. The ground wire may be bare or insulated and shall be of copper or approved copper-clad steel. If of copper, the the ground wire shall be not smaller than No. 14 B. & S. gage and if of approved copper-clad steel, it shall be not smaller than No. 17 B. & S. gage.

The ground wire shall be run in as straight a line as possible to a good permanent ground. Preference shall be given to water piping. Gas piping shall not be used for grounding protective devices. Other permissible grounds are grounded steel frames of buidings or other grounded metallic work in the building, and artificial grounds such as driven pipes, plates, cones, etc.

The ground wire shall be protected against mechanical injury. An approved ground clamp shall be used wherever the ground wire is connected to pipes or piping.

**Wires Inside Buildings.**

e. Wires inside buildings shall be securely fastened in a workmanlike manner and shall not come nearer than two inches to any electric light or power wire unless separated therefrom by some continuous and firmly-fixed non-conductor making a permanent separation. This non-conductor shall be in addition to any regular insulation on the wire. Porcelain tubing or approved flexible tubing may be used for encasing wires to comply with this rule.

**Receiving Equipment Ground Wire.**

f. The ground conductor may be bare or insulated and shall be of copper, approved copper-clad steel, or other approved metal which will not corrode excessively under existing conditions and in no case shall the ground wire be less than No. 14 B. & S. gage except that approved copper-clad steel not less than No. 17 B. & S. gage, may be used.

The ground wire may be run inside or outside of building. When receiving equipment ground wire is run in full compliance with rules for protective ground wire, in section d, it may be used as the ground conductor for the protective device.

The U. S. Bureau of Standards has issued a discussion and explanation of the proposed revision in which it is pointed out that these rules do not apply to radio equipment installed on shipboard, but have been prepared with reference to land stations.

In discussing the receiving equipment it is stated that indoor receiving antennas are not included within the requirements of this proposed rule, which provides for the protection of radio equipment against lightning. Indoor receiving antennas and auxiliary apparatus are, however, included in the general requirements covering the wiring of signal systems, for it is obviously desirable to insure, for example, the freedom of all rceiving apparatus from contact with electric power circuits either inside or outside of buildings.

It is desirable that electrical construction companies install radio antennas and apparatus for persons who are not familiar with electric wiring. This will tend to insure the installation of antennas and apparatus in a strong and durable manner. It is important that antenna wire be used in such size and tensile strength as to avoid its coming in contact with any electric power wires whatsoever.

The size and material of which the antenna is made should depend, to some extent, upon the length of the span which the antenna must bridge. It is suggested that for the ordinary receiving antenna about 100 feet long, No. 14 B. & S. gage soft-drawn copper wire can safely be used. If other materials are used, the size which is chosen should be such as to insure tensile strength at least equal to that of the No. 14 soft copper wire suggested.

The requirements covering splices and joints in the antenna span are for the purpose of avoiding accidental falling of such wires upon light or power wires, of less than 600 volts where it is found necessary to cross such lines. The rules, it will be noted, permit crossings with lines of 600 volts or less, if they do not happen to be trolley wires or feeders to trolley wires. In such a case, it is desirable to use wire of a larger size than No. 14 B. & S. gage in order to minimize the chance of accidental contact of the antenna with the power wires.

The interchangeable use of copper and of approved copper-clad conductor is suggested on account of the fact that these two kinds of wire are practically equivalent in their conductivity for high-frequency current.

No mention is made of the insulation from the building of the receiving antenna, or lead-in wire, except that this lead-in wire should be run through a bushing. The latter provision is chiefly to protect the wiring against the possibility of short-circuiting with electric power lines which may run in the wall and whose location may be unknown to the persons installing the radio equipment. This requirement serves also to protect the antenna lead-in wire against contact with metal lath or other metal parts of the building.

From a signaling standpoint, it is desirable to use insulators for receiving antennas in order that wet weather may not cause the antenna to become partly short-circuited to the ground.

The requirement for a protective device to be connected between the antenna and ground terminals of the receiving set is for the purpose of carrying lightning discharges or less violent discharges caused by induction or by atmospheric electricity to the ground with a minimum chance of damage to the receiving apparatus, building or operator. A fuse is not required as a part of the protective device, though lightning arresters, which are provided with fuses, will not necessarily fail to receive approval.

If a fused lightning arrester is used, it makes it less likely that the antenna terminal of a receiving set will be put at a high voltage in case the antenna falls upon an electric light or power wire. The absence of the fuse, on the other hand, makes it possible for the antenna, if it accidentally falls across the power wires, to become fused at the point of contact and thus fall to the ground and eliminate the hazard. The antenna terminal of the receiving set should be connected to the point of junction of the fuse with the arrester.

Lightning arresters may be used inside the building, and in such a case they will receive better protection from moisture and mechanical injury than lightning arresters placed on the outside of a building wall.

Protective devices of reliable manufacture are approved by the Underwriters' Laboratories, and can be depended upon to operate at the required voltage. The use of a cheaply constructed home-made arrester, is not recommended, since it may easily get out of order and fail to operate at the low voltage which is desirable.

Arresters should be inclosed in such a way as to protect the breakdown gap from dust. One disadvantage of the vacuum tube type of arrester is that it may cease to function without giving warning that it is inoperative.

A list of the approved protective devices and ground clamps is contained in the "List of Inspected Electrical Appliances," published by the Underwriters' Laboratories. This list is revised semi-annually and may be consulted upon application to the principal office of the Underwriters' Laboratories, Inc., 207 East Ohio St., Chicago, Ill., and at offices and agencies throughout the United States and Canada.

While an arrester connected between the antenna and ground is regarded by many as sufficient protection, it is somewhat safer to install a switch in parallel with it as an added protection. Particularly if the arrester is inside of the building and the ground connection is made to a radiator, it is desirable to use in addition the outside ground connection.

If the antenna is properly connected to the ground, such connection prevents the antenna from becoming a hazard to the building and its contents and may act

to supplement the protection given by lightning rods. The arrester should have the most direct connection to the ground which it is feasible to make, otherwise the antenna may become a hazard with respect to lightning.

While it is desirable to run the protective ground wire in as direct a line to ground as possible, it is more important to provide a satisfactory contact at the ground itself than to avoid a few bands in the ground wire.

If the ground wire of a receiving set passes through a wall, it should be insulated for the same reasons as the antenna lead-in wire referred to in the foregoing paragraph.

If the ground wire is exposed at all to mechanical injury, it should be of larger size than the minimum permitted under the rules and certainly not smaller than No. 10 B. & S. gage. It should, for mechanical protection, be enclosed in wood moulding or other insulating material. Ground wires should not be run through iron pipe or conduit because of the choking effect at radio and lightning frequencies.

For further suggestions regarding good and bad practice in the installation and maintenance of signal wires and equipment, reference should be made to "National Electrical Safety Code, 3rd edition, October 31, 1920, Bureau of Standards Handbook No. 3," and especially Section 39. This is obtainable for 40 cents from the Superintendent of Documents, Government Printing Office, Washington, D. C.

The 1920 edition of the "National Electrical Code" which contains the regulations of the National Board of Fire Underwriters, including Rule 86, which is now the rule in effect covering radio signaling apparatus, may be referred to at any local inspection department of the fire underwriters or may be purchased by sending 10 cents to the National Board of Fire Underwriters, 76 William St., New York City.

## Telephones in the Operation of Railroads.

The use of telephones in operating railroads has superseded the telegraph to a very large extent in recent years, and it has been found that a larger volume of traffic can be handled with greater speed than under the old method. In a paper before the Western Society of Engineers, in Chicago, Stanley Rhoads, telephone and telegraph engineer of the New York Central Lines, very ably described the complete system of telephones now in use by that company.

It is estimated that the use of telephones saves the company enough each year to pay for the entire cost of installing the equipment, when compared with the cost of operating by means of telegraph. This applies particularly to the main lines where the traffic is heavy, but decided savings are also effected on branch lines where the traffic is much lighter.

When telephones were first introduced into railroad service, it was feared that there would be many errors in handling train orders and some fear was felt as to the safety of operation. But experience has found that there is less error and the service is more flexible for the reason that especially trained operators are not necessary to accomplish the transmission of orders. In a great many cases the train orders are given directly to the conductor, thus eliminating the necessity of transmitting the message through the hands of a third person.

## Exchange in London Plans for "Fixed-Time" Call System.

On April 1 the Maryland exchange was opened in London, England, to replace the Stratford and Broadway exchanges. Switchboards and auxiliary apparatus of all kinds are of the common battery type.

Accommodations, at the opening, were provided for 2,000 subscribers and 460 trunks to other exchanges in London. The outside cable plant in the neighborhood is said to be ample, and the exchange will be capable of extension to meet needs of the district for some time. The Maryland exchange is the twelfth to open in London since the armistice.

Arrangements have been made to enable subscribers to book toll calls in advance. The calls, which will be effected at or about a specified hour, as desired by the subscriber, will be known as "fixed time" calls. The booking may be either for single call, which can be made by telephone or in writing, or for a daily call for a minimum period of a week, including or excluding Saturdays and Sundays, according to the wish of the subscriber, and under a standing order to be given in writing. The call will be regarded as effective if connection is made within ten minutes after the time for which it is booked.

A single "fixed time" call is to be booked at least three hours before the time at which it is required. Every effort is to be to complete a "fixed-time" call at or about the time desired, but in the event of inadequate notice, there will undoubtedly at times be a delay in obtaining the connection at the appointed hour. A "fixed-time" call may be of either three or six minutes' duration, but will not be extended beyond a period of six minutes, if there are other cells awaiting completion.

## Considering Wireless Telephony Between Stockholm and Finland.

Recent reports from Stockholm, Sweden, state that the military authorities in Finland have recommended to the council of state that a concession be given the South Finland Interurban Telephone Co. to establish a wireless telephone service between Helsingfors and Stockholm.

The Finnish telegraph administration to whom the matter was also referred has not yet reported. It appears, however, that it desires to have a telephone system between Finland and Stockholm in its own hands, by means of a cable, and for the purpose of inquiry a representative recently paid a visit to Stockholm. It is estimated that a cable would involve an expenditure of from 20,000,000 to 40,000,000 Finnish marks, whereas a wireless station for telephony would amount to 1,000,000 marks. The question remains unsettled.

Telegrams from Helsingfors report that a preliminary agreement has been reached for laying a telephone cable between Stockholm and Helsingfors, comprising nine lines. It is possible that radio may take the place of the cable.

## Many Canadian Cities Linked by One Telephone System.

One thousand cities, towns and hamlets are linked up by the lines of the Alberta government telephone system, according to the annual report of V. W. Smith, minister of railways and telephones.

The total assets of the system are $23,000,000. The total gross earning for 1921 were $2,406,183, and $1,558,025 was spent in operation and maintenance, leaving a surplus of $848,157, to which is added sundry net earnings of $411,499, making a total of $1,259,656. After deduction of sinking fund, interest, commission and contingencies, the net revenue was $268,627. The rural revenue was $452,006, the exchange revenue $976,214 and the toll revenue $977,962.

The telephone system is owned and operated by the provincial government. During the past year, several hundred miles of rural telephone lines were built. This rural service has been an important factor in building up the farm population and making farm life attractive.

It is now the boast of the Alberta government that every farmer, even in the remote corners of the province, either has a telephone in his home or is within convenient reach of a telephone.

## May-Day Blizzard Causes Trouble for Telephone and Telegraph.

Seeming to come from nowhere, a blizzard struck along the Colorado & Southern Railroad between Chugwater and Wheatland, Wyo., a distance of 50 miles, on the night of May 9. After the storm, there remained standing but 90 poles of about 4,000, the telephone and telegraph service between Denver and Casper, on the direct route, being a thing of the past for a number of hours.

The snowfall was so heavy it was necessary to use snow-plows to keep the trains moving and the wind was so violent that it blew down the big chimney at the Lander power plant, also causing scattered wire trouble in many sections of Wyoming.

# The Benefits from United Effort

## Resultful Service—The Reward of Combined Efforts of Employers, Employes, and the Public—Divided Efforts and Interest Retard Progress of Entire Force—Paper Presented at One of the Iowa Operators' Schools

Co-operation is the united effort to bring about some desired end. If we would have efficiency in our work, we must have co-operation, no matter what the work may be.

I once heard a pastor tell his people when he first came, that unless they co-operated with him in the work, he could do nothing. His people seemed to catch the vision and the work progressed wonderfully.

It was through the united and persistent effort of the Anti-Saloon League and other organizations, together with the people, that we have the prohibition laws which we are enjoying today.

One of the greatest principles in the life of Abraham Lincoln was co-operation. At the close of the Civil War, the country faced a problem greater than the war itself. It was the problem of reconstruction. Lincoln's solution of it was conciliation and co-operation. In one of his speeches he quoted, "A house divided against itself cannot stand." The Bible says, we cannot serve two masters. Neither can we have the best results in our work if we do not work unitedly.

It was the co-operation of everyone with Herbert Hoover in the conservation of food that made it possible for the boys who went to the front, and those who kept "the home fires burning," to have sufficient food while in the war. Had there not been co-operation—each one faithful to the task set before him—the great World War would never have been won by the Allies.

If there is to be success in our telephone work, there must be co-operation between employer, employes, and the public. We, as operators, have a large part in this. If we are only looking forward to quitting time and pay day, we are a detriment to the company, and our work is only drudgery. We would be slackers. We heard a great deal about slackers in war time, but we have slackers now as well as then. If we are disloyal to any trust which has been placed upon us, we become slackers.

If the employes in the different departments do not work together, there will be much time wasted. If a case of trouble is reported and the operator neglects to report it, or if, after she has reported it, the troubleman neglects to do his part, the work is delayed and the subscriber becomes dissatisfied.

We are paid not only for our time, but for the very best work we can do. If a thing is not worth doing well, it is not worth doing at all. We should not be satisfied with just knowing enough to get through the day, but should try and learn all we can about the work in hand. We are responsible for the success of the work, as far as our part has to do with it.

Theodore Roosevelt said: "I pity no man because he has to work. If he is worth his salt, he will work. I envy a man who has a work worth doing and does it well."

There are the operators who work together on the toll lines. We are so apt to think our difficulties are the only ones. If we could look into the different exchanges with which we are working and see some of the things they have to contend with, we would have more patience with each other, the work would be easier, less time would be wasted, and there would be less discontent.

Our work is such that if subscribers would co-operate with us it would be a wonderful source of help. If they could just understand that we really have an interest in them and are glad to help them! This can only be done by patience and giving them the best service we can.

There is much misunderstanding, chiefly because they are not acquainted with the work. This might be overcome by inviting them to visit the exchange and explaining the work to them.

To have the best possible result, there must be the co-operation of the entire force—employers, employes and the public. If we could but feel that we are a part of a large family, each taking an interest in the welfare of the other, the drudgery would be eliminated and our work would be a pleasure.

# Timing and Those Report Charges

## Operator Must Know When a Conversation is Started—It Is Also Important That Operators Learn That They Are Not Working To Obtain Report Charges, but To Complete as Much Business as Circumstances Will Permit

By Miss Lydia Page
*Story County Telephone Co., Nevada, Iowa*

Timing at the start of conversation is one of the most important parts of an operator's work on a long distance call. For this reason an operator must know when conversation is started. Conversation is considered started as soon as the subscriber at either telephone speaks to and obtains an answer from the other.

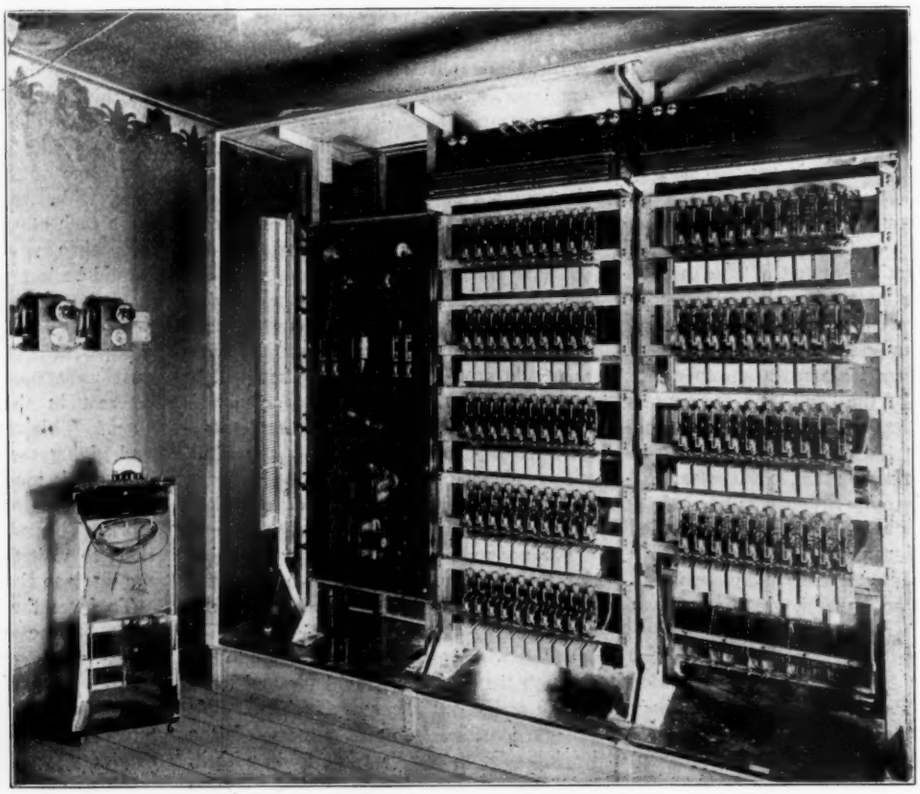
Many business men do not personally answer their own telephones. This duty is left for a clerk, stenographer, or an office boy. Many large business firms have what are called private branch exchange switchboards. In such cases, the operator at the switchboard is reached first. Then she reaches the party desired.

There are certain things that the operator needs to remember before stamping the start—that the called party is on the line and ready to talk.

If the connection is ordered established by the person who answers the called telephone, proceed as if the called party had been reached. There is a case, however, when the called party starts out immediately with an order, for instance, and does not wait for the called party to speak; in this case, the operator will stamp as soon as she finds the message is being transmitted.

The finish of conversation is not so difficult to know. When a disconnect signal appears, it is easy to determine when to stamp the elapsed time. The old practice made it necessary for the operator to call time at the end of the initial period on pay-station calls.

Under the new instructions, the operator does not need to do so unless requested by the calling party. In such a case, the operator will write "Notify—(whatever time calling party specifies). She shall then refer the subscriber to the supervisor. The supervisor will tell the party that every effort will be made to observe his request but that failure to do so will not relieve him from paying any excess charge.



**A typical 100 line C. A. X.—90 lines equipped**

*Paying operators to take care of your outlying exchanges is an unnecessary waste. The C. A. X. eliminates all regular attendants at outlying exchanges and their salaries become a net saving. Our engineers will be glad to explain the application of the C. A. X. in any one or more of your exchanges. No obligation.*

# A Self-Operating Exchange for the Small Town

Installing a C. A. X. (Community Automatic Exchange) in a small town or rural community means more than merely eliminating the operators at that point. Here are some of the other things accomplished by its use.

**Continuous service**—Rapid, accurate and reliable service twenty-four hours per day.

**All needs served**—The C. A. X. can be arranged to suit the particular traffic or service needs of any community—individual, party or rural lines using harmonic, automatic code or push button code ringing.

**No dry battery expense**—The C. A. X. operates from a common battery power plant, automatically charged at the proper intervals.

**Positive supervision**—The operator or maintainer at the nearest attended exchange can keep a positive check at all times on the operation of the C. A. X. By occasionally dialing a special code and listening for the alarm signal, unstandard conditions may usually be detected and corrected before the subscriber is aware of any trouble.

**Long distance**—Toll or other calls requiring the services of an operator are made by the C. A. X. subscriber dialing a special number which automatically connects him with an operator at the desired toll board.

**Ease of maintenance**—A visit by your regular maintenance man every week or two weeks is sufficient to keep the apparatus continuously in first-class condition.

## Automatic Electric Company

**FACTORY AND GENERAL OFFICES: CHICAGO, ILLINOIS**

**BRANCH OFFICES:**

| | | |
|---|---|---|
| New York City<br>21 East 40th St. | Cleveland<br>415 Cuyahoga Bldg. | Philadelphia<br>The Bourse Bldg. |
| Columbus<br>518 Ferris Bldg. | Boston<br>445 Tremont Bldg. | Rochester<br>Mercantile Bldg. |
| Detroit<br>525 Ford Bldg. | Washington<br>905 Munson Bldg. | Cincinnati<br>Union Central Bldg. |
| Los Angeles<br>238 San Fernando Bldg. | Pittsburgh<br>608 Fulton Bldg. | Kansas City<br>1001 New York Life Bldg. |

**ASSOCIATED COMPANIES:**

INTERNATIONAL TELEPHONE SALES AND ENGINEERING CORPORATION, New York
International Automatic Telephone Company, Ltd., London
Compagnie Francaise pour l'Exploitation des Procédés Thomson-Houston, Paris
Automatic Telephone Mfg. Co., Ltd., Liverpool
Automatic Telephones, Australasia, Ltd., Sydney

*In the small village as well as the large city, the dial is becoming the emblem of progressive telephony; it brings to small town subscribers the benefits and conveniences of big town service.*

Please tell the Advertiser you saw his Advertisement in TELEPHONY.

Where operators have the chronoscope, they start it at the start of conversation. When the time specified in the "special instruction" space is up, the operator cuts in and says, for example, "Your three minutes are up, signal when through, please."

If an operator does not have a chronoscope, she will, when she thinks the time is nearly up, stamp in the arrows lightly from time to time. When she has stamped her ticket out finally, she will draw a line through these arrows so that they will not conflict.

**Report Charges.**

A report charge is defined as a partial charge made on a person-to-person call if some information is received regarding the called telephone or the called party other than reports of *"BY," "DA"* or *"OD."* We know these three reports cannot be charged as we have not yet reached the called telephone. In fact, the company has not done all that it can do at the time of giving such reports.

If a telephone is busy, we will leave an order to call us as soon as the telephone can be reached. While it is not the telephone company's fault that people do not answer their telephones, the operators are instructed to make a reasonable effort to secure an answer. If the telephone is out of order, the company instructs its operators to arrange for a messenger service to reach the called party and the messenger rate is not charged if conversation is established.

When we consider the efforts which are made daily and the repeated use of circuits and operators' time on calls bearing such reports as "busy," "don't answer," etc., which bear no revenue for the telephone companies, is it not reasonable that a small charge, such as a report charge, should be made if after using the circuits we obtain some information from called telephone, or party?

So long as there is a chance to complete a call, operators are taught to make every reasonable effort. In fact, when the calling party is inclined to give up, the operator suggests that she will complete his call later, or from another telephone if he cannot wait at the first, or even at another town if, of course, such town is not too far distant.

When one stops to consider reports which indicate no chance for completion by the very reason of their nature, the reports received give information that the subscriber wants and, in fact, satisfy him as well, oftentimes better, than to have reached the party for he has found out what he wants and does not have to pay but about one-fourth the amount he expected.

As for traveling men who use public pay stations, ordinarily they know all about the reason for the report charge. If, however, they challenge an operator about paying for something they are not getting, she must assume that they do not know and tell them the charge is only a partial charge of the message charge, paid in advance, and the remainder will be paid if they talk. Usually she will find that an explanation of this kind puts her patron in not only a better frame of mind but also an understanding frame of mind. Besides, if every operator did this it would make it easier for all other operators.

Of the changes in the report-charge instructions there is only one of which I will speak. It is that our patron can revive a call the same day on which he ordered us to cancel it, even though we have given him a chargeable report previously. It can be carried over to a specified day on which the calling party has agreed to talk.

If we will remember that we are not working to obtain report charges on calls but are working to complete as much business as we can under the circumstances, the fact of the report charge is not going to worry many people.

## THE SECOND MILE

**By Miss Anne Barnes**

*Traveling Chief Operator, Iowa Independent Telephone Association, Des Moines, Iowa*

She was only a feeble old woman, poorly and scantily clad. She was such a one I fear that we often pass by with but a careless glance.

She hesitated as she reached the corner and looked helplessly up and down the street with eyes dimmed with age. Then she timidly stepped off of the curb to the street and scanned the name on an approaching car. Apparently she was not able to see the name on the car. She seemed to be hesitating between two intentions—one, to return to the safety of the curb; the other, to ask the motorman for information.

The motorman seemed to sense her uncertainty and—well, perhaps he never had the memory of a mother. He did not say a word, but he *looked* cold, hard facts down in the old lady's face. As she did not speak immediately—you know she was timid and nervous, and not used to being out alone—the motorman started the car; the little old lady retreated to the curb's safety. There she stood nervously twisting the straps of her worn leather hand bag.

About this time a man stepped from a nearby store. He walked to the curbing and looked in the direction from which the last car had recently come. He was a young man, full of vigor and life. One would have judged at a glance that he was a busy man and one who used every minute to good advantage. He must have been a man of importance in the community.

He noted an approaching car; he also noted the shabby, nervous, old woman vainly trying to decipher the name on the car. In an instant all trace of hurry and business fled from his eyes. As he stepped quickly to her side, he looked down into her faded old features as only a boy who has had a mother could look. He said gently: "The Emerson Street car. May I help you?"

All trace of nervous excitement left her face and she looked up with a perfect faith and trustfulness. He helped her onto the car and to a seat. As he handed her the hand bag, she said in a sweet, quavery, old voice: "It is so kind of you to help me that second mile."

Such service can never be bought.

How many opportunities have we, as operators, to help people the second mile. What may seem to us only an incident and pass quickly from our thoughts may live on in the memory of some one sorely in need of help on the second mile.

## Careless Radio Installation May Void Fire Insurance.

Radio fans are warned by the Department of Commerce that unless they give heed to fire insurance rules in connection with the "hooking up" of radio equipment, rates on their property may be raised or insurance may be refused to them entirely.

Attention is also called to the fact that fire insurance regulations governing the installation of radio apparatus are to be revised. This subject is now being considered by a committee of the National Board of Fire Underwriters.

## New Officers of T. T. & R. Section, Western Society of Engineers.

At a recent meeting of the telephone, telegraph and radio engineering section of the Western Society of Engineers, Chicago, officers for the new year were elected as follows:

Chairman, Burke Smith; vice-chairman, H. W. Mowry, and director for three years, F. R. Quayle.

# What Is Your Company Doing?

## Chats About Company Doings.

By Stanley R. Edwards.

The regular monthly meeting of the Marengo Commercial Club, Marengo, Iowa, was scheduled for the evening of May 9. May 9 and 10 were the dates selected for the operators' school, one of the series being held in Iowa this spring under the auspices of the Engineering Extension Department, Iowa State College.

D. C. Phillips, president of the Citizens Telephone Co., and H. F. Bramman, manager, arranged that the program, after the business session of the Commercial Club, should be provided by the Citizens Telephone Co. The announcement of the meeting said in reference to this:

"In conjunction with a two-day telephone operators' school held here at this time, the meeting will be turned over to the Citizens Telephone Co. at the conclusion of the business session.

The remainder of the evening's program as outlined to your secretary will be as follows:

Paper: "Letting the Town Talk," Miss Sophia Kienle, chief operator, Citizens Telephone Co.

Addresss: "The Story of the Telephone," Miss Anne Barnes, traveling chief operator, Iowa Independent Telephone Association.

Following the speaking program, we will be the guests of the Citizens Telephone Co. at the picture show, where a special show will be run depicting "Over the Hill."

It is requested by Mr. Phillips and Mr. Bramman that the wives of the members be preseent for both the speaking program and the picture show."

"This went over in great shape," wrote Mr. Phillips.

It's good publicity and makes for improved public relations. Other companies will do well to fall in line with the Indiana, Illinois, Iowa and Washington companies, which have been recently mentioned by TELEPHONY as doing things of this kind.

---

Recently the Kansas City Telephone Co., Kansas City, Mo., ran the four-column advertiser reproduced on this page. It's good human interest copy—"She's a Neighbor Girl of Yours"—and brings home to the readers of the paper the fact that the girl who serves their telephone wants is a real human being; in fact, she is just the same kind of a girl who takes care of the stenographic and other work in his office so efficiently.

An advertisement of this kind, particularly if followed up by others of a similar nature, is certain to result in greater consideration being given to the telephone operator by telephone users. It helps them to visualize the personality behind "the Voice With the Smile."

---

"The Case of the Keystone Automatic Telephone" is the title of a booklet just

**Advertisement Which Should Obtain Greater Consideration for Operators.**

sent to patrons by the Keystone Telephone Co., of Philadelphia, Pa. In it are told the advantages of the automatic system, which the Keystone is now operating, and the method of operating the subscriber's telephone.

The booklet concludes with the last pages devoted to "Notes by the Way," giving hints which make for greater efficiency in using telephone service.

---

Employes of the Wisconsin Telephone Co. sold more than half of the recent $5,000,000 issue of 7% per cent preferred stock, which was over-subscribed in 8½ days, according to a tabulation announced by W. R. McGovern, president of the company.

The number of employes who were available as salesmen during the drive was 4,264. They sold 28,973 shares or $2,897,300 worth of the issue. The remainder was sold by banks and investment houses.

Employes of 44 of the exchanges oversubscribed their quota. The largest oversubscription was turned in by the Winneconne exchange where two employes sold 134 shares or 1,116.6 per cent of their quota.

Only 802 shares were sold directly over the counter in the entire state, showing that the remarkable success of the drive was directly attributed to good salesmanship and the public's confidence in the company and its employes.

---

"Every three months," writes Wm. M. Bailey, general manager of the Richmond Home Telephone Co., Richmond, Ind., "a girl calls each subscriber, stating that she is the company's service inspector and wishes to know how his telephone is working. A record of this is kept in a book and each complaint is run down until an O. K. is secured from subscriber.

"With this method, we obtain an O. K. from each subscriber four times a year. By this means we feel that we keep in touch with every subscriber, assuring us a better opportunity of running down chronic complaints and rendering the most efficient service possible. I am very enthusiastic over the system, which we have used since 1908, and think that we have obtained wonderful results."

The service test conducted by the company for the first quarter of 1922 shows that the percentage of complaints to the number of telephones is only 0.039. So far as is known, the Richmond Home company is the only company in the United States that makes a complete canvass of its patrons, asking if they have any complaints.

Mr. Bailey has discussed the system with representatives of many other companies at conventions and none of them has ever heard of the system being used elsewhere. "You are inviting trouble," they told Mr. Bailey, when he told them of the system.

The operator uses the following form in making the test: "This is the telephone inspector. How is your telephone working?"

No complaints were found in the Boston exchange in the last quarter. On the farm lines the percentage of complaints was only 0.044.

Sometime ago the Indiana Public Service Commission stated in one of its orders that Mr. Bailey's company was the most efficient in the state. There's a reason.

---

The stampede for wireless telephony has been the cause of the telephone companies being made to suffer losses, many receivers and small parts being taken off of subscribers' telephones. In this connection, Dean Clark of the Mountain

States Telephone & Telegraph Co., Denver, Colo., which has lost many receivers lately due to theft, says:

"Special receivers of 2,000 ohms, or stronger, must be used for the proper reception of wireless telephony; therefore, these taken from our instruments will not serve the purpose intended. A stitch in time will save a rip, hence it is it behooves all of us to ask the daily newspaper to tell the public of this fact.

"Do not wait until the 'hoss' has been ridden away and then expect the robber to return him, saying that he is not a good saddle horse. If people understand that the taking of our receivers will not help them toward their wireless sets, they will let us alone."

---

The New Prague Telephone Co., New Prague, Minn., has a home-made radio telephone receiving set which has received from Pittsburgh, Pa.; Newark, N. J.; Schenectady, N. Y.; Indianapolis, Ind.; Chicago; Denver, Colo.; San Francisco, Calif., and other cities.

The set was made and installed by Miles A. Vopatek, son of S. A. Vopatek, president of the company. It consists of a regenerative set, detector, and two-step amplifier, with a 100-foot aerial 40 feet high.

Mr. Vopatek will be glad to demonstrate the set to any telephone man near New Prague or answer questions regarding it.

---

Federal prohibition agents in Southern Minnesota have hit upon a new scheme for making their periodical raids on soft drink emporiums more effective. Usually, after the first raid, all of the other places which may happen to be doing business in violation of the 18th amendment are tipped off by telephone. When the agents reach these bars, nothing but simple pop and ginger ale is being regaled by the thirsty loungers.

Seventeen agents in three automobiles swooped down upon New Ulm, Minn., late Friday night, May 5. Their first stop was at the telephone exchange, where arrangements were quickly made for preventing any conversation between the places selected for raids. Accordingly four dealers were caught with the goods and must answer to Uncle Sam in the Federal court for their indiscretion.

---

Young and budding radio fans of St. Paul have been making the Tri-State Telephone & Telegraph Co. no end of trouble as the result of an erroneous impression that ordinary telephone receivers can be used in constructing radio sets.

In one day five receivers were found missing from booths in the Ryan Hotel, while many other reports have been coming in to the company of similar petty thievery in scattered sections of the city. Engineers and radio experts assert that telephone receivers are worse than useless for radio sets and the Tri-State company was quick to make known this fact through the medium of the local newspapers. The trouble ceased forthwith.

---

About a year ago the Cherryvale (Kans.) Telephone Co. was granted an increase in rates at Cherryvale after a long, "knock-down, drag-out" fight with the Kansas Public Utilities Commission, the increase being only a portion of what was asked for.

The commission's attitude all through the case had such an effect on local sentiment that the increase was absolutely opposed at the time it was granted, and there was talk of court proceedings but nothing came of it.

As a retaliation the board having to do with the assessment of taxes met almost immediately thereafter and increased the taxes on the company's property sufficient to wipe out the increase in rates which had been granted, and away out of line with taxes on any other property.

Since the rates were increased, the company has spent quite a little money in Cherryvale in cable construction, etc., which, together with improvement in the operating personnel, has brought about a very high grade of service for a magneto plant.

The operating officials have been able to improve the public sentiment to such an extent that they are really boosters for the company, but they have been unable to do anything with the tax people. Hence they adopted advertising to put the question before all of their subscribers.

Full page space was used in The Daily Republican, one advertisement being headed "Taxes and Telephone Rates."

In the reading matter it was pointed out that taxes had increased from $1 per year for each subscriber to almost $3—$2.96 to be exact. Then it was shown that the telephone company's tax was on a higher basis than other concerns—probably 300 per cent higher—and that 10 per cent of its gross sales is paid in taxes.

This point is emphasized:

"It should be remembered that the telephone company does not really pay this tax; it is only the tax gatherer. So long as the telephone users in Cherryvale agree to the above method of tax gathering, the telephone company cannot complain, but we wish to remind you again that taxes are an expense and if the expense stays up where it is at present, the telephone rates will, of necessity, be raised.

The advertisement concludes with this paragraph in large type:

"Unless a change can be brought about, these taxes will remain on your telephone bill and, in addition thereto, the telephone rates will have to be increased again. We do not want this, but only what is fair. When you know the facts, we believe you will help us get this reduced, for you should not pay a greater tax in connection with your telephone service than you pay in connection with anything else you buy."

---

At a recent meeting of the Yale (Okla.) Chamber of Commerce, a program was given by the Oklahoma City Chamber of Commerce by radio through broadcasting station W. K. Y. at Oklahoma City and the radio telephone receiving equipment of the Yale Telephone Co.

The Yale Telephone Co. is the first telephone company in the state to install receiving equipment and, more especially to give its patrons the benefit of it.

"We enjoyed the radio ourselves," said Manager L. W. Scherer, who by the way is secretary of the telephone division of the Oklahoma Utilities Association, "and thought it our responsibility to give our patrons an opportunity to listen also."

---

The operating organization of the Kansas City Telephone Co., under the general direction of P. H. Hopkins, vice-president, is "taking the telephone exchange to the public," so to speak.

In late April the opening "show," or rather entertainment, was "put on" before about 500 employes of the company.

First there was a demonstration of the various steps in the handling of a call, by means of small switchboards representing the Harrison and Westport exchanges.

The first call put through originated in the Harrison exchange and was for a Harrison number. This was followed by a call from the Harrison subscriber for a Westport subscriber. How cut-offs occur and the possibilities for their increase when the call goes through one or more private branch exchanges was shown.

The reasons for "wrong numbers" were explained and the correct and incorrect ways of using the telephone were demonstrated. Then came a musical program, followed by brief talks by some of the company officials.

The company's publicity man booked the "show" for appearance before the principal civic clubs such as the commercial clubs of Kansas City, Mo., and Kansas City, Kans., schools and churches, women's clubs and other organizations.

---

Many of the managers of the New England Telephone & Telegraph Co. are using a plan that can not help but bring results.

When a new telephone has been placed, an employe calls the subscriber by telephone and gives him a sort of welcome to the "Telephone Subscriber Family." Incidentally the advantages and conveniences of the company's toll service is explained. In the majority of cases this calling is handled by the traffic department.

# In the Realm of the Telephone Man

## Pole Derrick Which Is Producing Excellent Results.

After several years' experimentation the Chesapeake & Potomac Telephone Co., of Baltimore, Md., has developed a pole derrick which is said to greatly facilitate telephone construction work. About 60 per cent of the company's trucks are now equipped for the attachment of this derrick, and it is said to be capable of producing remarkable results.

The operation of this derrick and its uses are described by F. S. Crismond in one of the late issues of The Transmitter, the company's employes' publication, as follows:

"When erected, the pole derrick has four positions, which makes it extremely flexible for all kinds of work. It can be attached to any one of our standard construction trucks with bodies which are designed with attachments for the purpose. Part of the attachment to the truck is a low compartment for carrying the derrick.

The pole derrick, in telephone construction, is a great saving device of time and man power. It is light in construction and can be erected by three men and a chauffeur in three minutes. Under average conditions, as many as 20 poles are set in an hour. With the derrick and three men it becomes possible to do 25 per cent more work than can be done by six or seven men without the derrick.

The pole derrick provides means in construction work that could not be used otherwise, where streets are widened and lines moved back, and in moving heavy construction pole lines from one side of the road to the other.

It has a wide range of uses. It sets poles, resets and moves poles, transfers cables, cable boxes, transformers, pulls stumps, loads and unloads poles, cables, or any heavy material from cars and barges, and it is used to place or remove loading coils in manholes.

The pole derrick and necessary equipment and attachments are made in the company's general repair shop at Washington, D. C., and from there shipped to various parts of the territory where needed. The entire equipment is so flexible that it can be shipped easily to a given point and attached to a truck in a day and a half. A year ago the work of equipping C. & P. trucks with the new type of pole derrick was started, and today about 60 per cent of the trucks in our territory are equipped for the derrick.

The pole derrick has proved a valuable asset to the construction work of the company. The 'productivity' of construction gangs has been greatly increased by its use, and the time and energy expended in developing the present type of derrick has proved an excellent investment."

## Methods of Fastening Wires on Various Surfaces.

The methods of fastening interior telephone wires when installation is being made oftentimes present some problems.

It is sometimes possible to place and fasten wires along the picture molding in a room. This provides a desirable run if there is room in the groove to accommodate the wires. The work of placing this wire should be done very carefully.

The installer should, as nearly as possible, try to follow the trim or casing of doors or windows when making vertical runs on walls in offices or residences. It is best to place the wires next to the plastered wall and nail into the wood rim. A short nail, preferably the ½-inch size, should be used in hardwood, because the longer ones will not drive without bending over and often the short ones will bend.

Take great care that the nail does not bend, for an extra blow of the hammer may cause the shaft of the nail to cut across the wire and perhaps cut it in two. If the run is well protected or concealed by the woodwork, spacing for the nails may be from 14 to 20 inches, depending upon the surrounding conditions; it is preferable, however, to nail wires securely and insure a permanent good appearance.

Nails should be spaced so that the wire closely follows the contour of the surface wired over when wires are nailed on irregular surfaces.

## Resplicing Duplex Toll Cables in Oakland, Calif.

The accompanying illustration shows the equipment used by the Pacific Telephone & Telegraph Co. in resplicing duplex toll cables in Oakland, Calif. To the right may be seen a specially designed pump operated by a gasoline engine, both of which are mounted on a four-wheel trailer. A two-wheel trailer carries the hose, which is used in pumping the water from the manholes. This equipment is towed by a Ford automobile.

The photograph shows the men using a special capacity and balance cable testing set, operated by a one-fourth horsepower motor at 3,500 R.P.M.

## Elaborate System of Private Telephone for Taxicab Company.

The Black & White Taxicab Co., of San Francisco, Calif., maintains a central telephone exchange which is connected to the company's branch stations in every part of the city by private wire, which makes it possible to maintain such a splendid record for promptness that within five minutes after a call a cab will be at the door.

The minute a call is received for a taxicab, the telephone operator calls up

Equipment Used by Pacific Telephone & Telegraph Co. in Resplicing Duplex Toll Cable.

the branch station nearest the address from which the call was received, and directs one of the taxicab drivers stationed at that branch to the number desiring the cab. When a driver delivers a customer to his destination, the driver immediately proceeds to the nearest branch station and using the company's private telephone reports the fact to the central operator, and receives further orders if there are any.

One of the accompanying illustrations shows the method of arranging the telephones at the branch stations. These branch stations are located usually at hotels and cafes. At a point close to where the taxicabs are parked, a call bell is arranged so that the drivers will easily hear all telephone calls for their particular station.

A special box is attached to the outside of the cafe or hotel, in which the telephone is placed. Each telephone is connected to the main switchboard by a private wire. Each telephone box is provided with a door and lock, and each driver carries a key for opening the lock.

The other photograph reproduced on this page shows the main switchboard at the company's headquarters, 850 Ellis street. Over the switchboard is a specially designed board, which shows the location of every taxicab. The board is provided with a large number of holes into which plugs are adapted to be placed. Each plug carries a number, the number corresponding to the number of each taxicab. At the top of the board are a number of holes for the cars that are *off duty*. When a car goes off duty, the plug with the number corresponding to that car is placed in one of these holes.

At the bottom of the board are a number of holes for the plugs representing cars that are out on a trip. Each of the branch stands are provided with several holes for the plugs representing the cars stationed at these stands. When a car leaves any stand for any reason the plug corresponding to that car is removed. If the car goes off duty, the plug is placed in the off duty section. If the car goes out on a trip the plug is placed in the proper hole, and when the car returns to its stand the plug is placed in one of the holes devoted to this stand.

## Testing the Transmitter for Short Circuiting.

When the transmitter is short-circuited, the subscriber can get Central and understand what she is saying, but cannot be heard. In testing for this trouble, see that the battery is flowing to the transmitter by putting the test set between L2 and No. 2 of the coil. The circuit is complete if there is a click in the test set.

Open one side of the transmitter connections and then put the clips of the test set across the break. If the transmitter is short-circuited, the operator can hear from the test set.

If a transmitter is open or short-circuited, or noisy, due to an improper amount of carbon granules in the case, do not try to adjust it or repair it, but replace the transmitter with a new one. As transmitters are very sensitive, all adjustments should be made at the shop or factory and given a transmission test before being placed in service again.

## General Information Concerning Substation Circuits.

Two distinct parts, the "signaling circuit," and the "talking circuit," make up a subscriber's set. And it is necessary to keep one part separate from the other. This is taken care of by means of the automatic hook switch.

By employing a few simple directions, substation circuits may be easily worked out. If one is familiar with the most common circuits, it is not necessary to remember lengthy circuits.

The ringer and generator comprises the signaling apparatus in a local battery set. The generator is dispensed with in a common battery set, but a condenser is usually added.

The transmitter circuit and the receiver circuit comprise the talking parts of each type of instrument. Associated with the receiver is the secondary of the induction coil. The inside or primary winding is always connected with the transmitter and the source of current.

## 75 Per Cent of Fire Alarms in Goshen, Ind., by Telephone.

More than 75 per cent of the fire alarms in Goshen, Ind., are made through use of the telephone, according to members of the Goshen fire department. In 1921, 102 alarms were received, 78 of which were made by telephone and the remaining 24 by the Gamewell automatic alarm system in use there.

Sixteen alarms were received in January, all telephone warnings with the exception of one.

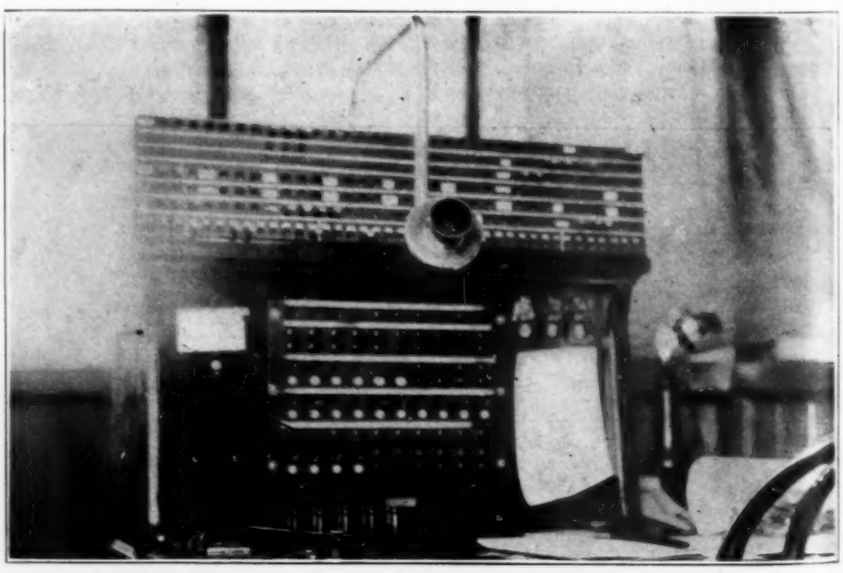
The telephone is preferable over the Gamewell system of using a fire alarm signal box, the firemen say, because the exact location of the fire can be given by the calling party.

Ordinarily when an alarm is sent from a box, the sender of the alarm fails to remain at the box to direct the apparatus to the fire.

The telephone is more practical also, firemen say, because of the fact the fire can gain more headway while the person is running to the alarm box.

Immediate connection can be obtained with the fire department by telephone when a fire is discovered, and the department will have several moments additional time in arriving at the scene of the conflagration.

**Method of Arranging Telephones at Branch Stations Usually Located Outside of Hotels and Cafes.**



**Main Switchboard at Headquarters of Black & White Taxicab Company San Francisco.**

# Northeastern Indiana Has Meeting

## Spring Meeting of the Northeastern Indiana Telephone Association Held at Fort Wayne—Officers Elected and Many Important Topics Discussed—Wired Wireless Given Considerable Attention—The Operators' School a Feature

The spring meeting of the Northeastern Indiana Telephone Association, which was held in Fort Wayne, May 23, was well attended, and the snappy business talks and technical demonstrations held the attention of members and visitors to a remarkable degree.

President P. J. Maloney, of Columbia City, opened the meeting, acting as chairman throughout the day. After a short address, in which he expressed his pleasure and satisfaction for the good attendance, and outlined briefly the order of the day's business, he requested the secretary to read the minutes of the meeting of October 25, 1921. H. A. Barnhart suggested a slight change, proposing to designate Mr. Hosea's talk as "Dynamic" instead of "Animated," the term used to describe it in the minutes. With this change, the minutes were accepted as read. The treasurer's report was then read, and accepted.

The chair announced the election of officers and appointed a nominating committee, consisting of W. E. Bowers, New Haven; Max Hosea, Indianapolis, and E. L. Taylor, Fort Wayne, to nominate candidates for president, vice-president and secretary-treasurer for the ensuing year and to report during the afternoon session.

Senator W. E. Bowers delivered the address of welcome in place of Edward M. Wilson, director of the Home Telephone & Telegraph Co., whose name appeared upon the program, but who was called out of town the day before. In well-chosen words, the senator extended to the convention a hearty welcome, in behalf of the Chamber of Commerce and the Home Telephone & Telegraph Co., and also a standing invitation to meet as often as possible in Fort Wayne in the future. Upon conclusion of Senator Bowers' address, H. A. Barnhart, president of the Indiana Telephone Association, was presented as the next speaker.

In a most interesting manner, Mr. Barnhart touched upon many subjects of importance to the telephone business. He particularly urged the improvement of toll service and the construction of first-class toll lines as the best means of accomplishing results in this respect. He also called attention to the present agitation among the public in general to abolish the public service commission and requested that every telephone man exert his influence at the next election, working for such candidates who are favorable to the retension of the Indiana Public Service Commission. At the conclusion of his address, Mr. Barnhart extended an urgent invitation to all present to attend the telephone meeting to be held at Lake Wawasee, June 14, 15 and 16.

Charles S. Norton, of the Indiana Bell Telephone Co., Indianapolis, in the course of his remarks also sounded a warning in regard to the danger of the abolishing of the public service commission through political influence. He recalled to the minds of his hearers the troublesome times when all utilities were at the mercy of local administrations, with all the uncertainties of political intrigue, and annoying demands of the successful political parties which happened to be in power. Mr. Norton's address closed the morning session and the meeting adjourned for luncheon.

### THE DRIFTER.

**The man who drifts and lets himself slip along with the current, because he is thus spared the pain of willing and of overcoming obstacles, never reaches a harbor.**—Business and the Man.

The greater part of the afternoon session was devoted to the discussion and demonstration of wired wireless by Chester I. Hall, research engineer of the General Electric Co.

Mr. Hall demonstrated the wonderful possibilities of radio transmission, particularly in its relation to the telephone business. He illustrated the utilization of telephone circuits for the transmission of radio waves and the possibilities of giving radio service through the telephone apparatus to the subscribers.

Although his demonstration lasted over an hour and a half, he held the attention of his hearers to the very last, and the lively discussions which followed proved conclusively that his hearers were greatly interested in the subject and were sincere in their expression of appreciation at its close.

Following Mr. Hall's address, the nominating committee presented its report. Senator Bowers, as chairman, reported these nominations: For president, P. J. Maloney, manager Whitley County Telephone Co., Columbia City; for vice-president, C. L. Knipple, manager, Huntington exchange, Huntington, and for secretary-treasurer, Martin Umbach, toll commercial superintendent, Home Telephone & Telegraph Co., Ft. Wayne. The report was accepted and the nominees elected by unanimous vote to serve for the ensuing year.

For chairman of the program committee, Martin Umbach of Fort Wayne, was appointed with instructions to select additional members.

As a fitting conclusion of the convention, Max Hosea, treasurer of the Indiana Telephone Association, aroused the enthusiasm of the audience by staging a regular inspiration meeting, calling upon each to introduce himself and to give an account of his telephone experience. He succeeded in furnishing an interesting half hour of entertainment for the convention, at the same time accomplishing the desired results of getting everyone acquainted. In his closing remarks, Mr. Hosea claimed this convention to have been the best and most enjoyable of his life.

W. S. Vivian, manager of the department of public relations for the Automatic Electric Co., of Chicago, spoke briefly upon the benefits and importance of retaining good relations between the managers of the telephone companies and the public, advising a friendly and congenial attitude of the manager towards his subscriber and the public in general.

In connection with the association meeting, an operators' school was held under the auspices of the association. The school was under the direction of Miss Marguerite Shea, chief observer of the Indiana Bell Telephone Co., assisted by Mrs. Kitty Williams, chief instructress of the Home Telephone & Telegraph Co., and was conducted along practical lines of operating, explaining in detail the correct and complete makeup of the toll ticket. This was illustrated on the blackboard, and all phrases, codes, notations of time and reports were correctly written in their proper places and explained to the operators.

E. L. Gaines, traffic superintendent of the Home Telephone & Telegraph Co., opened the school with a few words of welcome. During the day W. S. Vivian, one of the very first to promote the systematic teaching of toll operating by means of operator schools, and who has possibly done more to improve and systematize Independent toll operating than any one man in the Independent telephone field, addressed the young women on the subject, "The Invention and Growth of the Telephone."

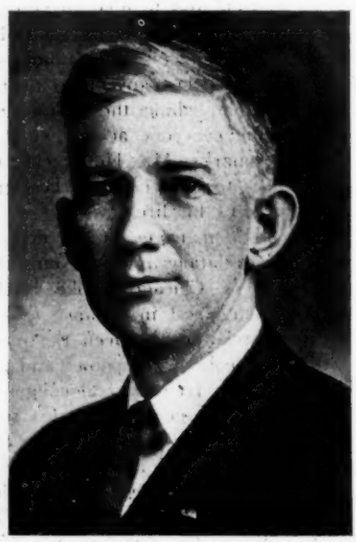
In the afternoon F. V. Newman, general manager of the La Porte Telephone Co., spoke upon the good to be obtained from operators' meetings, and advised the operators to show the proper spirit and pass it along to the operators who were unable to attend.

After the close of the session, the operators visited the local and toll operating rooms of the Home Telephone & Telegraph Co. and the toll operating room of the Indiana Bell Telephone Co.

# Personal and Biographical Notes

**Robert W. Hedrick,** the newly-elected secretary of the Missouri Telephone Association, was born in Ottumwa, Iowa, and received his education in that state.

Upon finishing school, Mr. Hedrick entered the employ of the Burlington rail-



**Secretary R. W. Hedrick Will Make Many Friends for the Missouri Association.**

way. He was with that company more than six years, the last three of which he was ticket and passenger agent for the company at Chicago. Resigning at Chicago he spent a year in Wyoming and then went to Missouri locating at Cole Camp in Benton county in 1908.

He represented Benton county as a member of the house in the 48th and 49th general assemblies. He was appointed corporation attorney in the state department in January, 1921, from which he resigned upon his election as secretary of the Missouri Telephone Association.

"R. W." is a Shriner and well known throughout Missouri. Owing to his friendliness and also honesty of purpose he is extremely popular. He is peculiarly fitted in many ways to fill the office of secretary of the Missouri association. While he has practically no knowledge of the telephone business, it does not take him long to get hold of the essential details of a proposition. Then comes action —for "R. W." has plenty of energy and push to methodically and effectively put behind whatever he undertakes. And he stays with it right to the end.

**Charles Hall,** president of the Coos & Curry Telephone Co., of Marshfield, Ore., and state senator, just missed the nomination for governor of Oregon at the state-wide primaries May 19, according to preliminary returns.

There is still some doubt as to the nomination, the contest between Mr. Hall and Governor Ben W. Olcott being very close, and it is apparent that the official count will be required to determine the outcome. Tabulation of returns the latter part of last week gave Governor Olcott a plurality of about 250.

Mr. Hall has been a telephone man for about 12 years. In 1914 he organized the Coos & Curry Telephone Co., the "Farthest West" company which now operates extensively in the southwest portion of Oregon. Besides building up his company, Mr. Hall has taken a prominent part in civic and social enterprises in his state.

**C. A. Thomas,** of St. Paul, Minn., an employe of The Tri-State Telephone & Telegraph Co. since 1916, has been appointed secretary to Mayor-elect Arthur E. Nelson. He will assume his new duties when the new mayor ascends the throne early this month.

Mr. Thomas has had no experience in the political game but has established a local reputation as a good mixer, a hard, conscientious worker and his newspaper and publicity experience, although somewhat limited, will stand him in good stead as buffer in the front office of the chief executive.

Mr. Thomas began his telephone training early in 1916 when he entered the contract department of the Tri-State Company, under C. B. Hall, now assistant to the president. He enlisted in the 309th Field Signal Battalion in 1917. He was later transferred to the 420th telegraph battalion and was a second lieutenant when mustered out in April, 1919.

He returned at once to the telephone company, this time in the auditing department. A few months later he was transferred to the advertising department where his work as associate editor of The Tri-State Emblem, the company house organ, helped materially to establish it as one of the best telephone publications in the country. When publication was temporarily suspended a year ago on account of financial conditions, he again was transferred to the office of the local commercial manager. He asked that his resignation become effective June 1.

**George L. Sterns,** manager of the Northwestern Bell Telephone Co. at Thief River Falls, Minn., since 1908, has been promoted to the managership of the St. Cloud exchange. At the time Mr. Sterns took charge of the Thief River exchange, there were 260 subscribers, requiring the service of one man and three operators. The present subscribers number 1,265, and four men, besides the manager and secretary, and 13 operators are employed.

Mr. Sterns always took an active part in local affairs, and last year served as secretary of the Thief River Commercial Club.

**R. C. Mathews** is the new manager of the Washington plant of the Indiana Bell Telephone Co. He succeeds George W. Dyke, who recently was promoted to manager of the company's plant at Frankfort. He has been chief clerk in the company's main offices at Indianapolis.

**Louis F. Schweitzer** is now in charge of the wire plant of the Portland Telephone Co., of Brockton, N. Y. Before taking this position, he was manager of the Home Telephone Co., of Sheffield, Pa.

**F. O. Hale,** who was recently elected vice-president and general manager of the Illinois Bell Telephone Co., became chief engineer of the company in April, 1921. He came from St. Louis, Mo., where he had been general manager of the Missouri division of the Southwestern Bell Telephone Co. System.

Mr. Hale was graduated from Dartmouth College in 1903, and a few months later entered the telephone business as a clerk in the traffic engineering department at Pittsburgh, Pa. In 1909 he joined the American Telephone & Telegraph Co.'s engineering department in New York City.

**Chief Engineer F. O. Hale of the Illinois Bell Co. Has Had Both Engineering and Business Experience.**

In 1912 he was transferred to St. Louis as chief engineer of the Southwestern System, and four years later was made general manager for the state of Missouri with headquarters in St. Louis.

# Toll Revenues in Nebraska Case

## Motion to Have A. T. & T. Co. Substituted for Northwestern Bell Overruled by Commission—Discussion of Division of Toll and Local Exchange Revenues—Comparisons of Operating Expenses of Bell and Independent Companies

The Nebraska State Railway Commission has overruled the motion of protesting subscribers of the Northwestern Bell Telephone Co. to have the American Telephone & Telegraph Co. substituted for it as applicant for a rate increase on the ground that, as it owns all the stock of the Northwestern, it is the real party at interest, and then to have it dismissed because the record shows the parent Bell to be now paying 9 per cent dividends. The commission held that the Northwestern is the only legal entity it can deal with, and, in effect, that the identity of the stockholder is immaterial.

The next attack launched on the Northwestern was that it was seeking to unload all expenses of giving toll service onto the exchanges and then neglecting to credit them with their due proportion of toll revenues. This was met by a series of interesting exhibits showing the refinement of bookkeeping possible in a public utility that can afford to divide and subdivide accounts.

Vice-President Pratt said that, as a matter of fact, it is a physical impossibility to make a division between toll and exchange costs that will accurately reflect the facts. The company can say it has so much invested in toll property and so much in exchange property, but as a matter of fact most toll calls originate at the subscriber's station, and the completing of the call requires the use of exchange lines, exchange operators, and exchange equipment.

The plan followed by the Bell in making the segregation for the purposes of the hearing is to assume that as the proportion of exchange revenue to toll is as three to one, a fourth of the entire property was devoted to toll; or, in another way, to regard toll service as one added to the exchange as a development of the business, and, therefore, to ascertain the respective proportions to just take away from the whole what has been added for toll purposes.

Applying these methods, with a few adjustments, to the Northwestern Bell property in Nebraska, it is found that the cost of the property devoted to exchange service is $12,809,000 and that for toll service is $3,976,000. Operating revenues from exchange service alone in the state totaled $3,310,000. Expenses totaled $2,741,000, leaving a net operating income of $568,000. Deducting taxes and adding rents and miscellaneous income, there was left for dividend returns $390,000, or 3.05 per cent.

Toll revenues aggregated $1,054,000. Deducting operating expenses of $757,278 and rents, taxes, uncollectible revenue, etc., of $108,000, there was left for return $188,388, or 4.74 per cent on the nearly four millions of toll property. This return, Mr. Pratt explained, was naturally larger than that for exchange because, as had been pointed out, part of the exchange property was actually used for this toll service.

The company submitted that taking either horn of the proposition, either separate or both together, by no possible means could it be shown or argued that the company is receiving revenues sufficient to justify present rates and certainly nothing to justify the 9 per cent reduction asked.

H. A. Livermore, statistician for the company, showed how the company's experts had devised a system of revenue accounting that would accurately throw into the various accounts the proper proportions for each class of service. They count the total number of subscribers' accounts having exchange service only, those having toll service only, and those having both. The number having exchange service only is weighted with a proportion of those accounts having both.

The number so developed is then divided by the total number of subscriber accounts to obtain the proportion of labor of the ledger section—the bookkeeping department—chargeable to exchange. Similarly the toll proportion is based on the ratio of the number of accounts having toll charges only, appropriately weighted with a proportion of those accounts having both to the total number of accounts.

In computing payroll allocations the experts take the payroll of the toll section and charge that to it. The order and addressograph pay roll is charged to exchange, and the balance divided on the basis of ledger, toll and order and addressograph sections.

The total payroll of both the exchange and toll arrived at on the foregoing basis is used to obtain the percentage applied to the distribution of the entire revenue accounting expense between exchange and toll. The exchange portion of the expense is divided between exchanges on the basis of the main line stations plus the P. B. X. trunks.

Engineer Woodford submitted the results of extensive depreciation studies made by the Bell company. Mr. Woodford said that these represented a combination of the old method with two new ones. The result showed that 5 per cent a year on the original cost of the property is necessary in order to take care of depreciation each year. This must be uniform throughout the life so as to be accurate and sufficient to equal the original cost plus the cost of removal, less salvage value at the time of its retirement, computed at the prices of new apparatus. The experience of the company forms the basis for this computation. In short, it means that for every dollar of property in use there must be set aside each year a nickel so that by the time that property has disappeared, there is another dollar ready to replace the property.

In addition, said Mr. Woodford, to the portion of capital consumed in furnishing service, there must be laid aside, when too large to be paid out of running expenses, the losses from extraordinary causes, such as severe storms. These must appear in depreciation.

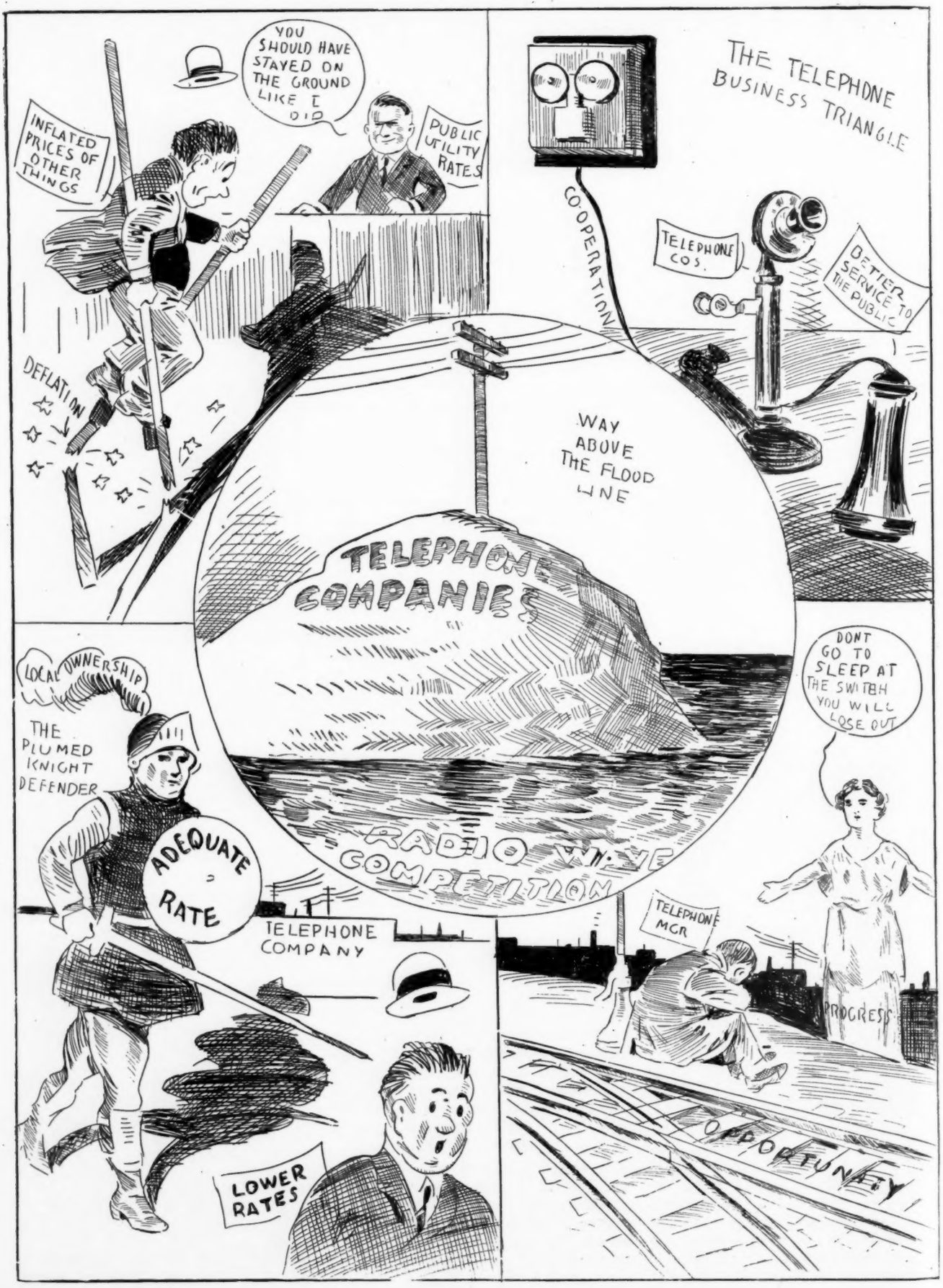
It is true that the depreciation is small for the first few years and rapid in the later years, but as an equitable proposition to the subscribers the expenses represented by consumption of capital must be spread over the entire period of the life of a plant. He presented a number of mortality curves as the company records disclosed them. The value of a mortality curve, he explained, depends on the volume of plant included in the investigation, and these were largely based on studies of the Minnesota property when the rate case there was submitted.

Mr. Woodford said that two other methods, that cost less and which return practically the same results, were used by him in securing his percentages.

One of these is known as the reverse accumulation of retirements. The start is made at a specified date and goes back in accumulating the amount of plant retired as shown by credits to the fixed capital account until the accumulated retirement equals the plant investment at that time. The other is the reverse accumulation of gross additions. In this

### GREAT TALKERS AND REALITY.

**The great talkers who dominate parliamentary assemblies are generally miserably interior in statesmanship. They may prevail in verbal encounter as they can always find more sonorous words than those used by their critics. But their strength lies in vagueness. Force them to face the facts, for reality kills them.**—Napoleon.


THE TELEPHONE BUSINESS TRIANGLE
YOU SHOULD HAVE STAYED ON THE GROUND LIKE I DID
INFLATED PRICES OF OTHER THINGS
PUBLIC UTILITY RATES
DEFLATION
CO-OPERATION
TELEPHONE COS.
BETTER SERVICE TO THE PUBLIC
WAY ABOVE THE FLOOD LINE
TELEPHONE COMPANIES
RADIO WIRE COMPETITION
LOCAL OWNERSHIP
THE PLUMED KNIGHT DEFENDER
ADEQUATE RATE
TELEPHONE COMPANY
LOWER RATES
DONT GO TO SLEEP AT THE SWITCH YOU WILL LOSE OUT
TELEPHONE MGR
PROGRESS
OPPORTUNITY

the pursuit involves the inclusion of the accumulations as shown by charges to the fixed capital account till the gross additions are equal to the total investment in that class of plant at the date of starting the revenue accounting.

His figures showed that the cost of removal and salvage values had fluctuated widely. Where possible, these were determined from the actual results on the records of the auditor from 1913 to 1921. In computing storm damages, unusual factors entered. There must not only be an allowance for the excess cost above normal, because of the necessity of paying no attention to hours and wage rates, but there must be an allowance for the expense of putting up and removing the equipment placed for temporary use and the cost of removing the damaged or destroyed property.

Lloyd B. Wilson, general commercial superintendent, said the proposed change in rates and classification of exchanges would add $150,190 to the company's yearly revenues in Nebraska. Deducting $14,000 that will be lost by the application of the state commission's new service connection charges, this would leave in excess of $136,000, of which Omaha would bear $110,000 and of this amount, $83,616 would come from added private branch exchange increased rates, he declared.

The Bell operates 108 exchanges in the state, most of them in the North Platte territory. Instead of individual exchange schedules, the company is asking for the approval of a classification of exchanges, which puts 17 into Class A, with 36 in B, 17 in C, seven in E, three in F and five in G. Class D is subdivided, one being in competitive territory and carrying competitive rates, another being a grounded exchange, and the others being listed with the same rates. Omaha is in a class by itself.

The first class includes all exchanges in towns of 800 population where the total number of stations is 300 or less. The fundamental bases, Mr. Wilson said, were population, stations in service, and value of service. This he defined to consist largely of the number of persons who can be reached and the cost and expense to the user of getting a substitute. Several subscribers, he added, had sued for $10,000 when names had been accidentally omitted from directories.

The opposition submitted costs of operation of exchanges in three of the large Independent companies of the state to show that Bell costs are higher. They also challenged the reports of the company which showed that exchanges were operated on a different per station cost basis.

The Independent company at Greeley charges $2.50 for business and $1.35 for residence, has a revenue of $10,763 a year and expenses of $9,000, making a profit of nearly $2,000. At St. Paul, the Bell charges $3.75 and $2.25, has revenues of $14,651 and operating expenses of $22,278, including $6,334 for depreciation. It pays its operators $6,400 a year, while the payroll at Greeley is $1,817 a year for operators.

This was one of a number of exchanges of nearly similar size that the attorneys for the objectors cited. When the Bell attorneys answered by saying that the Independent service was not comparable with that of the Bell, he replied that he did not assert the service was as good, but thought it was a service with which the people could get along, and that there is not enough difference in the service to account for the difference in rates and operating expenses.

At the conclusion of the testimony for the objectors, the case was adjourned until June 6, in order to allow the commission representatives and the cities' attorneys to dissect the evidence submitted by the Northwestern Bell.

# Commissions, Courts and Councils

## Discussion and Rulings of State Bodies Having Supervision Over Telephone Companies—Decisions of Courts in Matters of Interest to Public Utilities and Actions of City Councils Relative to Franchise, Rates and Service

### New York Company Granted Federal Injunction Against Decrease.

The injunction applied for by the New York Telephone Co. to restrain the New York Public Service Commission from forcing the company to reduce its rates 5 per cent in New York City and about 7 per cent elsewhere in the state was granted May 26 in a unanimous opinion of the statutory federal court consisting of Judges Chas. M. Hough, J. C. Knox and A. N. Hand. The order of the commission, made March 3, was to have become effective April 1. The company pleaded that the proposed rate was confiscatory and unreasonable.

The opinion of the court, written by Judge Hough, finds that the cost and working capital of the company's plant in New York state devoted to telephone uses totaled more than $240,000,000 on Jan. 1. An opposing estimate, made by Milo R. Maltbie, was $225,000,000. The company has upward of 877,000 patrons.

It is stated that the commission's orders would have decreased the company's income $2,900,000 a year. The gross revenue of the company during 1921, the opinion states, was $80,032,204 from intrastate business, leaving a net revenue of $8,175,180.

"It is so evident as to dispense with discussion that to deduct anything from this net revenue (if correctly stated) is to leave a most unfair return even on cost," said the court.

The opinion refers to the attack made by the commission on the expenses charged against operating returns by the company. It is stated that for several years the average depreciation rate has not varied much from 5.80 per cent. Because this money was not used as fast as it was accumulated, the balance now held by the company, the commission contended, is such that the rate for the current year should be lowered and $3,000,000 be set aside as an addition to income.

The opinion explains that the company is controlled by the American Telephone & Telegraph Co. and that the plaintiff company is obliged to pay the controlling company license fees which are charged annually as an expense. The commission contended that these license fees should be decreased by $2,500,000 annually. Reference is also made to objection by the commission to charging $500,000 a year as income taxes to the cost of operation. Summarizing the evidence on which the reductions were based, the court's opinion reads:

"The commission says to the plaintiff, 'We do not challenge the mere arithmetic of your bookkeeping, but we do assert that by your own showing you have received in the recent past and will receive in the near future $6,000,000 a year which you have charged to expense, which you ought to carry to income. Therefore, if you do what you ought to do and transfer that sum to income, you will have a fair return upon your investment, notwithstanding the reductions we have ordered.'"

The opinion states that the rate from which a reduction is made prevailed throughout the last half of 1921. During this period, it is added, the net income of the plaintiff was $4,061,400; that at this rate the year's income would amount to $8,122,800, and that if the transfer from depreciation and license charge were made the amount would be increased by $5,500,000, making a total of $13,622,800.

It is then pointed out that if the reductions ordered by the commission had prevailed during 1921, there would have resulted a loss of income totaling $1,700,000. This is believed to be a low estimate and would leave for the company a return of less than 6 per cent upon the

Maltbie estimate of the cost of the company's plant.

"The orders complained of are called 'temporary,'" says the court, "but the description is immaterial if they are really confiscatory. As matter of law there is no difference between the permanent and temporary confiscation or deprivation of that to which the complaining party is entitled—in this case a fair return.

"What amount of money is a fair return depends primarily upon the value of the investment, and, in ascertaining such value, cost is but one element, though an important one.

"In ascertaining such cost the account books of plaintiff, long kept in accordance with the requirements both of the Interstate Commerce Commission and the State Public Service Commission, furnish evidence—a point which we regard as settled by the recently concluded litigation over the gas supply of New York City."

Concluding its opinion, the court said:

"We do not undertake to make a rate, but we are of opinion that such a return as is hereinabove indicated, admitting *arguendo* all the foregoing contentions of the defendants (except the matter of federal income tax) is not and cannot possibly be a fair return for any business like the telephone business in or near the state or city of New York at the present time.

"Injunctions may go as prayed for."

## Asks Leave to Sell to Pacific Telephone Company.

An application was filed on May 22 with the California Railroad Commission by the Delta Telephone & Telegraph Co. for permission to sell a portion of its system to the Pacific Telephone & Telegraph Co. The Delta company operates in the southern part of Sacramento county and its headquarters are at Courtland.

Part of the line it is proposed to sell is a lead carrying circuits of both companies and the price agreed upon is $450.

## Brief of Michigan Bell Asserts Lack of Jurisdiction.

In a brief filed on May 20 by Thomas E. Long, attorney for the Michigan State Telephone Co., in connection with the statewide rate case, it is contended that the Michigan commission has no jurisdiction over the matter of telephone service or rates.

Mr. Long contends that under the terms of the transportation act of 1920, the Interstate Commerce Commission alone has jurisdiction over the matter.

The transportation act provides that the Interstate Commerce Commission shall have jurisdiction over the transmission of intelligence by wire or wireless from one state into any other state, district or territory of the United States.

Each telephone in Michigan is an integral part of the nationwide Bell telephone system and is therefore properly interstate commerce business, according to the brief.

## California Company Has 25 Per Cent Business Increase.

Santa Monica Bay Home Telephone Co., reciting that its business shows an increase of 25 per cent in the last year and a half, asked for an order of the California Railroad Commission on May 24 permitting it to sell $28,000 of its preferred stock, $50,000 of first mortgage bonds and to borrow, not exceeding $10,000 at any one time, the loans to be repaid from funds derived from the sale of securities.

The company reports that total expenditures for capital account for the current year to provide for the growth of the system and meet the demands of the service will approximate $100,000, nearly all of which has been contracted for.

## Florida Company Receives Schedules of Higher Rates.

The Peninsular Telephone Co., of Tampa, Fla., was given authority to place advanced rate schedules in effect on July 1 for its Bartow, Haines City, Lake Wales and Frost Proof exchanges. The orders were dated May 17.

The maximum rates allowed for Bartow and vicinity are shown in the first column; those for Haines City, Lake Wales and Frost Proof are listed in the second column:

| | | |
|---|---|---|
| Business: | | |
| One-party | $4.50 | $3.50 |
| Two-party | 4.00 | ... |
| Four-party | 3.50 | 2.75 |
| Extension | 1.00 | 1.00 |
| Residence: | | |
| One-party | 3.00 | 2.25 |
| Two-party | 2.50 | ... |
| Four-party | 2.00 | 1.75 |
| Extension | 1.00 | 1.00 |

Rates outside the exchange base rate area are to be:

| | | |
|---|---|---|
| Within three miles of city limits: | | |
| Business: | | |
| One-party | $6.00 | ... |
| Two-party | 3.50 | ... |
| Residence: | | |
| One-party | 3.25 | ... |
| Residence (party) | ... | 2.25 |
| Within four miles of city limits: | | |
| Business (party) | ... | $3.00 |
| Residence (party) | 2.25 | ... |
| Within five miles of city limits: | | |
| Business (party) | 4.00 | ... |
| Residence (party) | 3.00 | ... |
| Within eight miles of city limits: | | |
| Business (party) | 4.50 | 4.00 |
| Residence (party) | 3.25 | 3.00 |
| Development, owning and maintaining plant and equipment to meet company lines | ... | 2.50 |
| Desk sets | .25 | .25 |

## Minnesota Company Granted Part of Advance Asked For.

The business and rural multi-party rates of the Willow Creek Telephone Co., of Amboy, Minn., were increased 25 cents a month by the commission's order of May 20. The raise, which was effective June 1, applies to both the Amboy and Vernon Center exchanges.

The schedule of increases presented by the company was not allowed in its entirety, as it was shown at the hearing that the expense of connecting 79 rural stations with outside exchanges was paid by the company, while the commission held that it should be borne by those receiving the service and not be spread over all the subscribers of the company.

The following schedule shows the company's old and new rates:

| Business— | Old | New |
|---|---|---|
| One-party | $1.50 | $2.00 |
| Two-party | ... | 1.50 |
| Residence— | | |
| One-party | 1.50 | 1.50 |
| Four-party | ... | 1.25 |
| Rural— | | |
| Multi-party | 1.25 | 1.50 |
| Switching | .25 | .35 |

The Willow Creek company owns the local exchange at Vernon Center, serving 208 local and rural stations. It also owns one-half interest in the local exchange at Amboy, to which 139 town and 212 rural stations are connected. The Sterling-Amboy Telephone Co., also of Amboy, owns the other half of the Amboy exchange. The former company operates the exchange and divides the revenue and expense with the latter company on an equal basis.

## May Continue Present Rates but Must Improve Service.

An order to reconstruct certain portions of its plant to furnish adequate service was issued to the Armstrong Telephone Exchange Co., of Madelia, Minn., on May 19 by the railroad and warehouse commission. This was done in pursuance to petition filed by a number of subscribers who are dissatisfied with the service they have been receiving.

The company is given 90 days to complete the repairs, after which the commission intends to investigate the service furnished and make such other order as may be necessary.

The petitioners had also asked that the rates be reduced to $1 a month, but this the commission declined to order.

At the hearing, testimony was offered to show that considerable difficulty was experienced in obtaining response from the central office; that on several occasions it was necessary to drive to town in order to obtain the doctor for cases of serious illness; and that the poles, cross arms, brackets and wires on rural lines were not in condition to render good service.

The company showed that an increase had been authorized on March 1, 1920, but that it was not put into effect until October, because the company desired to repair all lines before charging the new rate. During that period $5,620 were

# Insurance against Pole Decay—

LOOK at the two transmission line poles shown in the upper illustration. The rotted pole was not protected from decay. After 14 to 15 years' service it was unfit for further use and had to be replaced.

Because of increased timber costs, the new 60-foot cedar pole, erected in 1920, cost over twice as much as the original pole. Instead of lasting 15 years, however, the new pole will serve 30 years or more because the butt is protected from decay with Carbosota, the standard liquid creosote oil. Thus, wood preservation may be used to offset the increasing cost of timber. Had the original pole been carbosoted, its life would have been doubled and its cost per year of service reduced by 60%.

Carbosota, properly applied to chestnut and cedar poles, is insurance against the expensive replacements that result from premature decay. It is the highest grade of coal-tar creosote oil and has a physical fitness that makes it unequalled for all non-pressure methods of application—Surface treatments or the Open Tank process.

When you specify Carbosota you remove all doubts as to the efficiency of the preservative and the benefit of the treatment.

Preservation against pole decay by Open Tank treatment with Carbosota is not only a sound economy, but a substantial aid to timber conservation as well. If the present rate of pole consumption is not checked, in a very few years the price of poles may be prohibitive. Write for free folder No. 406—"Creosoted Poles are Economical."

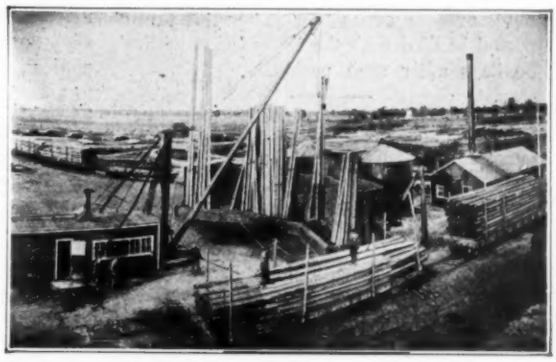
*(Poles should be thoroughly seasoned, especially when surface treatments are to be applied, and the portions to be treated carefully cleaned of all adhering inner bark.)*

The Barrett Company

| | | | | | |
|---|---|---|---|---|---|
| New York | Chicago | Philadelphia | Boston | St. Louis | Cleveland |
| Cincinnati | Pittsburgh | Detroit | New Orleans | Birmingham | Kansas City |
| Minneapolis | Dallas | Syracuse | Peoria | Atlanta | Duluth |
| Salt Lake City | Bangor | Washington | Johnstown | Lebanon | Youngstown |
| Milwaukee | Toledo | Columbus | Richmond | Latrobe | Bethlehem |
| Elizabeth | Buffalo | Baltimore | Omaha | Houston | Denver |
| Jacksonville | | | | | |

THE BARRETT COMPANY, Limited: Montreal Toronto Winnipeg Vancouver St. John, N. B. Halifax, N. S.

*Pole at right, set untreated in 1906, now unfit for further service and replaced by carbosoted (butt-treated) cedar pole which will last 30 years or more.*



*Open Tank process treating plant of The Naugle Pole & Tie Co., Pinconning, Michigan.*

Barrett Carbosota For Preserving Wood

spent for reconstruction of plant and $1,558 for maintenance. The petitioners admitted this, but were of the opinion that, due to improper supervision of the workmen and general inefficiency, the company did not receive the full benefit of the expenditure. The company admitted that the switchboard is not working properly, and thinks the economical course would be to put in a new switchboard.

It was the opinion of the commission that the subscribers were justified in their demand for more efficient service, but that the rates could not be reduced at this time, as the company only earned 2 per cent on a fair value of the property for interest, dividends and surplus during 1921.

## Advances Allowed Last Year Renewed by Missouri Commission.

Orders were entered by the Missouri Public Service Commission on May 23 allowing three companies to continue operating under increased rates granted a year ago.

The rates of the Edina Telephone Co., of Edina, were increased on May 8, 1920, and again approved on April 16, 1921. The rates of the Southwestern Bell Telephone Co. for its exchange at St. Charles were increased on May 31, 1920, and renewed on April 22, 1921. The rates of the Buchanan County Mutual Telephone Co. at its De Kalb exchange were raised on April 14, 1921.

The advances were continued upon showing by the respective companies that they had not been sufficient to pay an unreasonable rate of return on the investment. It is required that reports of revenues and expenses for each 12-month period be filed with the commission within 30 days after such period.

## Petition for Approval of Additional Stock for Merger Purposes.

Eben D. Warner and W. H. Ostenberg, principal stockholders of the Platte Valley Telephone Co., of Scottsbluff, Neb., recently purchased the capital stock of the Wehn company, which has operated for a number of years in the territory east of their section, and spent $40,000 in rebuilding it.

They now plan a consolidation of the two properties, and on May 15 presented to the Nebraska State Railway Commission a petition to permit the Platte Valley company to issue $100,000 of stock in addition to the $225,000 now outstanding. Of this, $25,000 is to be used to purchase the Wehn capital stock, the remainder to take up the notes of the latter issued to Mr. Warner and Mr. Ostenberg in payment of the improvements they put in and also to take up some indebtedness.

The Platte Valley is taking this step as preliminary to adding to its bond issue, having already made arrangements for the flotation of a considerable amount. Bonds cannot be issued in excess of two-thirds of the capital stock, and for this reason the capitalization is being increased.

It was found that for the $75,000 issue, the necessary 60 days' notice of application had not been given, but the bond attorney agreed that this formality might be covered by having the order make the issue contingent on a 60-day notice.

## Kinloch Sale Receives Missouri O. K.—Two Years to Unite.

The sale of the Kinloch properties in Missouri to the Southwestern Bell Telephone Co. was authorized by the Missouri Public Service Commission on May 23, subject to the carrying out of the terms of the contract which the commission approved. The companies affected are the Kinloch Telephone System, Kinloch Long Distance Telephone Co. and Kinloch Building Co., all of St. Louis, the Sedalia Home Telephone Co. and the Suburban Telephone Co.

The Southwestern Bell is given permission by the order to use such part of the $7,500,000 7 per cent cumulative preferred stock issue recently authorized, as may be necessary to pay the consideration named in the contract and to defray the expenses incident to joining the systems. Three shares of this stock will be given for two shares of Kinlock common stock.

The commission set two years as a reasonable time within which to complete the arrangements necessary for unified service. A provision is made for an extension of time in case of strikes, inability to secure material or other causes beyond the control of the purchasing company.

Upon its acquisition of the properties, the Southwestern Bell is ordered to furnish the subscribers of the Kinloch companies with the same kind of service and to afford them the same toll facilities they have been receiving. After the unification the Kinloch subscribers are to be placed on the same status as the Bell subscribers.

Until the actual physical consolidation of the plants so as to give unified service, the Bell company is allowed to operate the separate exchanges at such existing rates as are now on file with the commission. The application for an adjustment in rates is denied, but the company may file another petition for an increase.

## Service of Nebraska Rural Line Before Commission.

On the complaint of Philip Schafer, who insists that W. J. Philpot runs the poorest telephone company in Nebraska, the state railway commission ordered Mr. Philpot to appear on May 31 to show cause why he should not be ordered to at once put the property into such shape that service can properly be given.

The commission sent an examiner to go over the lines owned by Mr. Philpot, whose rural service is connected with the Lincoln company's exchange at Nehawka, and he reported that the complaints were well founded. Fifty per cent of the insulators are gone, says Schafer, and many lines are tied to live trees.

## Value of Telephone Property in New York City $136,000,000.

In a hearing in New York City on May 23 before the public service commission concerning the value of the property used by the New York Telephone Co. in New York City, Frankland Briggs, counsel for the company, said that the book value of the property was $136,000,000.

He explained that this amount represented only the cost and the equipment of the plant and did not take into account the rise in values since 1914. At that time, he said, the commission appraised the company's property at $86,000,000. Since then, he stated, the company had spent nearly $100,000,000 in additional facilities.

James G. Wray, consulting engineer employed by the city, said in reply to questions by Assistant Corporation Counsel M. M. Fertig, that the improvements made by the company since 1914 had reduced the annual per cent of depreciation from 9 to nearly 4 per cent.

Mr. Fertig said that the city would note these facts in its petition for lower telephone rates.

## Further Testimony in New York on Parent Bell Assistance.

Inquiry into the state-wide affairs of the New York Telephone Co. was resumed at New York City on May 25. A session was also held on May 26, after which the hearing was continued to the week of June 12.

F. L. Rhodes, development engineer of the American Telephone & Telegraph Co., was under cross-examination by Deputy Attorney General T. F. Fennell, representing the state of New York. He again brought out that the development and engineering assistance rendered by the parent company, which have accounted in part for the nation-wide Bell system today, could not be performed entirely by the New York company, even if it desired to do so.

He also declared that, as a result of this centralized development work, great economies had been effected in the operation of the associated companies of the Bell system, of which the New York company is one.

At the next day's session four witnesses gave testimony on the same general subject of the relationship between the parent company and the New York company.

Sergius P. Grace, consulting engineer, declared that the savings of the New York company as a result of the use of patents and improvements developed by the A. T. & F. totaled more than $73,500,000. Of this amount, he said, the use of the vacuum tube repeater on lines in the state of New York represented a

# A27 Cable Terminal

## *Self - Cleaning*

Equipped with

**P495**

**Sawtooth Discharge Blocks**

*Without Extra Charge*

Reliable Electric Company

**3145 Carroll Ave., Chicago, Ill.**

Please tell the Advertiser you saw his Advertisement in TELEPHONY.

saving totaling more than $6,000,000.

Robert F. Estabrook, a traffic engineer of the American company, and R. E. Walker, general traffic supervisor of the New York company, were likewise questioned concerning the assistance given the latter company in operating methods and practices. C. A. Heiss, comptroller of the American company, also submitted to a long series of questions on accounting matters.

## Ohio Court Reverses Commission on Zoning System.

By a vote of four to three, the Ohio Supreme Court set aside the zoning system of the Cincinnati & Suburban Bell Telephone Co. which had been approved by the public utilities commission a year ago. The case was remanded to the commission for rehearing. The order reversing the commission's decision was dated May 16.

Eleven different appeals by Cincinnati and suburbs were filed with the court. The suits were based on the action of the telephone company dividing the metropolitan area into eight exchange areas, with a flat rate for each and toll charges of at least 10 cents for telephoning from one area to another.

Suburbs affected were Mt. Washington, Delhi, Glendale, Maderia, Indian Hill, Terrace Park, Cleves, Addyston, Mt. Healthy and Sharonville.

Chief Justice Marshall and Judges Hough, Johnson and Wanamaker concurred in the decision to reverse the utilities commission. Judges Jones, Mathias and Robinson dissented. The majority, however, differed as to reasons and did not agree on a single opinion.

The chief justice, in his individual opinion, said:

"Small municipalities and residence communities forming the suburbs of a large city, the inhabitants of which suburban communities have their social and commercial interests in the metropolitan center, cannot be said to have separate community interests.

"Where a telephone business has been built up to include such city and its suburbs, with free call service throughout the entire district, the telephone company may not thereafter separate the suburbs into separate exchange areas and make toll charges for calls beyond the boundaries of each exchange area, and to do so amounts to unjust discrimination.

"Exchange areas should be so arranged by a telephone company as to give free service to all inhabitants within the radius of general community interest."

## Increase Proposed, 400 Subscribers of Ohio Company Quit.

More than 400 subscribers of the Geneva Telephone Co., of Geneva, Ohio, have ordered their telephones taken out as a sequel to the demand of the company for a rate increase, it was said by opponents of the increase.

Those opposing the increase say that if the company could make a profit at prevailing rates during the war period, there is no justification for advancing rates at this time.

The proposed new rates would have each patron pay an added 50 cents a month.

Several hearings have been held in Columbus before the commission, and on May 8 a postponement was granted to May 18.

## Company Not Required to Connect with Private Line.

The services furnished by the Steninger Telephone Co., of Parker, S. D., being of good quality, the South Dakota Railroad Commission decided that there was no reason for some nine or ten individuals to build a private line and receive connection with the Steninger Company.

It developed at the hearing that F. B. Elce, the president of the private line called the Elce Independent Telephone Line, had had some misunderstanding about rates with the Steninger Telephone Co. while he was a subscriber. As a result of this, he got together eight other subscribers of the company and one who was not a subscriber, and three miles of line were constructed parallel to the Steninger lines. This, the commission thought, was a needless duplication.

The petition of the Elce line that the Steninger Telephone Co. be required to connect with it was denied on the ground that the complainant took an inconsistent stand. On the one hand, the private line did not wish to comply with the laws regulating telephone business, for the reason that the men along the line are farmers and are not engaged in the telephone business and there would be no rental charge, except the $3.00 yearly switching charge. They would divide the charges of construction. On the other hand, application was made for physical connection as a telephone company.

In denying the order, the commission stated that it would be detrimental to the Steninger Telephone Co. to oblige it to connect with the Elce line, and thus put three or four miles of its own lines out of use. The petition was dimissed on May 15.

The Steninger company serves an area of 460 miles, having approximately 575 exchange subscribers and 775 rural subscribers. The complainants in this case were subscribers of the company's Howard rural line.

## Summary of Commission Rulings and Schedule of Hearings.

CALIFORNIA.

May 22: Application filed by Delta Telephone & Telegraph Co., of Courtland, for permission to sell a portion of its system to the Pacific Telephone & Telegraph Co.

May 22: Order entered authorizing San Fernando Telephone & Telegraph Co., of San Fernando, to use $4,350 of the proceeds of a stock issue previously authorized to finance the cost of additions, beterments and improvements.

FLORIDA.

May 17: Peninsular Telephone Co., of Tampa, granted new schedule of rates for Bartow and vicinity.

May 17: Increased rates allowed for Haines City, Lake Wales and Frost Proof exchanges of Peninsular Telephone Co., of Tampa.

INDIANA.

June 19: Hearing to be held at Indianapolis on application filed June 28, 1921, by Indiana Bell Telephone Co. requesting increased rates. Partial increase was temporarily granted on December 16, 1921, and company now seeks permanent increase.

KANSAS.

April 17: Albert Telephone Co., of Albert, granted certificate of convenience and authority to transact the business of a telephone utility.

April 17: Farmers & Merchants Telephone Co. allowed to sell its plant and property at Albert to the Albert Telephone Co.

April 18: Application of the Utica Telephone Co., of Utica, for permission to make certain changes in the rates for service at Utica; the company was allowed to increase its rates from $1.00 to $1.25 per month, provided the proceeds be used to improve the service within the next six months.

April 26: Application of the Oketo Mutual Telephone Co., of Oketo, for authority to reduce rates for telephone service at Oketo; the company was allowed to change its rates as follows: Subscribers owning and maintaining the instruments, $1.00; company owning and maintaining all equipment, $1.25.

April 28: Application of Ira Botts for permission to sell Sharon Springs Telephone System, of Sharon Springs, to W. M. Cowgill, allowed.

May 8: Application of Suburban Telephone Company, of Tonganoxie, for a certificate relating to a proposed issue of its preferred stock in the amount of $10,000 allowed.

MICHIGAN.

May 20: Briefs filed by Michigan State Telephone Co. in statewide rate case.

MISSOURI.

May 19: Southwestern Bell Telephone Co. ordered to restore telephone service to W. N. Rankin, J. H. Baer and H. T. Byars, Jr., before June 15; also required to install and maintain a pole line, except where the pole line leaves the public highway to reach the premises of Mr. Byars, and to install and maintain all wires and other necessary equipment; order effective June 1.

May 23: Increase in rates of Edina Telephone Co., of Edina, which was granted March 8, 1920, and renewed April 16, 1921, continued.

May 23: Rates of Southwestern Bell Telephone Co. for its St. Charles exchange to continue under increase allowed March 31, 1920, and renewed April 22, 1921.

May 23: Advance allowed Buchanan County Mutual Telephone Co. April 14, 1921, for its De Kalb exchange, continued until further notice.

May 24: In the matter of complaint filed against the Versailles Telephone Co., of Versailles, by the Farmers' Commercial Wire and E. J. Fry; cause having been set for hearing May 10 and no appearances having been made either on that

*"INDIANA"*

# TELEPHONE AND TELEGRAPH WIRE

## PROVEN BEST BY TEST

Time and the aid of America's foremost engineers, have enabled us to develop and manufacture the highest grade wire known to the trade. It is greatest in conductivity and lasting qualities, due to the superior quality of material from which it is made, as well as its *Extra Double Galvanizing*, which insures longest life.

## STEEL STRAND

*Single and Double Galvanized, Standard, Siemens-Martin, High Strength and Extra High Strength Grades.*

*HANDLED BY MOST JOBBERS*

MANUFACTURED BY

**INDIANA STEEL & WIRE CO.**

MUNCIE, INDIANA



# CHAPMAN ARRESTERS

**Chapman Lightning Arresters**

Have no vacuum to lose, neither do they contain anything to melt, fuse or ground the line.

The patented self-cleaning air gap is housed in a marvelous weatherproof case, that is moisture, dust and bug-proof, a combination that insures uninterrupted service without attention—and that constitutes the "makings" of a real Lightning Arrester.

**What Say You Men? Speak Out!**

***Manufactured by***

**MINNESOTA ELECTRIC CO**

**Minneapolis, Minn.**

# №1

## 1 Man=50 Feet

One man carries 50 feet of Johns-Manville Fibre Conduit—two men with a barrow carry five hundred feet—and no breakage.

—Only one reason why it costs less to install.

JOHNS-MANVILLE, INCORPORATED
Madison Ave. at 41st St., New York City
*Branches in 57 Large Cities*
For Canada:
Canadian Johns-Manville Co., Ltd., Toronto

*Send for booklet*



# JOHNS-MANVILLE

## Fibre Conduit

Through
ASBESTOS
and its allied products
Electrical Materials
Brake Linings
Insulations
Roofings
Packings
Cements
Fire Protection Products

date or since, case dismissed for want of prosecution.

NEBRASKA.

May 22: Hearing begun on the application of the Northwestern Bell Telephone Co. for permanent rate schedule and approval of exchange classification; testimony taken and further hearing adjourned until June 6.

May 23: Application filed by the Monroe Telephone Co. for permission to issue $18,000 of stock as a dividend covering past sacrifices of returns and to sell $10,000 additional stock for improvements and betterments.

NEW YORK.

June 1: Hearing held at Albany on application of Rochester Telephone Corp., of Rochester, for certificate of public convenience and necessity of construction; also as to issuing capital stock, mortgage, mortgage bonds and an agreement as to notes, etc.; also joint petition of Rochester Telephone Corp., Rochester Telephone Co. and New York Telephone Co. as to transfer of local franchises from last two companies to Rochester Telephone Corp.

June 2: Hearing held at Albany in matter of rates charged David R. Belcher, of Hartford, by New York Telephone Co.

June 12: Hearing to be held on statewide affairs of New York Telephone Co.

NORTH DAKOTA.

May 23: Permission given the Northwestern Bell Telephone Co. to close Kunze toll station.

May 23: Petition of Park River Telephone Co., of Park River, for modification of findings of fact and conclusions denied.

May 23: Permission given Cavalier Telephone Exchange Co., of Cavalier, to abandon 3½ miles of pole line at Concrete.

OHIO.

May 16: Hearing on Ohio Bell Telephone Co. application for increased rates in Findlay deferred to June 16.

WISCONSIN.

May 24: Unified rate schedule allowed to be established by Wittenberg Telephone Co., of Wittenberg, for its exchanges at Wittenberg, Eland and Elderon.

May 24: La Farge Telephone Co., of La Farge, allowed to install toll charge of 10 cents between La Farge and Cashton, revenue to be divided between La Farge company, Buckeye Telephone Co. and New Cashton Telephone Co.

May 24: Increase from $1.00 to $1.50 authorized to be made by Summit Telephone Co. upon petition of subscribers.

June 2: Hearing held at Madison in matter of A. G. Becker and others vs. Allenton-Kohlsville Telephone Co., of Allenton, and Washington County Telephone Co. on order to show cause for rehearing. U-2474.

June 6: Hearing at Prairie du Chien on proposed extension of Union Telephone Co., of Prairie du Chien, in town of Prairie du Chien. T-1043.

June 9: Hearing at Madison on application of Necedah Telephone Co., of Necedah, for increased rates. U-2718.

June 12: Hearing at Madison on complaint of Ray S. Owen and others against Wisconsin Telephone Co. in matter of refusal to transmit speeches, etc. U-2689.

FOR SALE—Telephone exchange, 220 subscribers, 30 business $2.50, 190 rural $1.50 per month. Address Freeport Telephone Co., Freeport, Minn.

FOR SALE—Telephone exchange of 140 stations; splendid future for increase. $3000 down, balance on easy terms. Forced to sell; don't answer unless you have the money. Address 4945, care of TELEPHONY.

WANTED TO BUY—Telephone plant of from 250 to 1000 telephones, in Illinois or Indiana. Address 4949, care of TELEPHONY.

WANTED TO BUY—Controlling interest in small telephone plant with position as manager. Technical graduate; best references. Missouri preferred. Address 4947, care of TELEPHONY.

## POSITION WANTED

WANTED—Connection with company wanting manager or wire chief, or combination. Would invest. Technical expert; best reference; make proposition. Address 4948, care of TELEPHONY.

WANTED—Position by first-class telephone man, capable of taking care of construction work, line, instrument and switchboard trouble; 38 years old; married. Best of references. Address Box 235, Romney, W. Va.

NORTHERN CEDAR POLES WESTERN
BUTT-TREATING GUARANTEED GRADES
BELL LUMBER COMPANY, MINNEAPOLIS, MINN.

Hot Galvanized Pole Line Hardware
M. LANZ BOLT CO. PITTSBURGH, PA.

Save Your Old Poles
Protect Your New Ones

Poles rotted at the ground line, or broken and about to fall, can be salvaged and made as strong as when first set by the simple installation of American Pole Protective Sleeves.

This device, made of Armco Ingot Iron, is placed about the base of the pole in two halves, locked together with a key strip and driven into the ground with a sledge, or with the American driving jack.

Poles reinforced in this way are as strong as a new pole, are unaffected by decay or attack by moisture at the ground line, and require no attention as long as the top of the pole is good for service.

The cost of renewing poles in this way is much less than the cost of setting a new pole, and the installation of this protector is insurance against fire and wind and ice storms.

*Manufactured by*
The American Rolling Mill Company
Middletown, Ohio

For full particulars and prices write to
AMERICAN POLE PROTECTIVE CO.
State Bank Building, Freeport, Illinois

NORTHERN POLE and LUMBER COMPANY
POLE SERVICE
DULUTH MINNESOTA

NORTHERN-WESTERN
CEDAR POLES
A FULL ASSORTMENT OF SIZES
PROMPT SHIPMENTS ASSURED
T. M. PARTRIDGE LUMBER COMPANY
Lumber Exchange MINNEAPOLIS

DIAMOND EXPANSION BOLT Co
90 West St. ◇ New York
MANUFACTURERS
Expansion Bolts Drills
Screw Anchors Toggle Bolts
Cable Clamps Bridle Rings
Duct Rods Guy Clamps
GALVANIZING
PLANT - GARWOOD, N. J.
DISTRIBUTORS
Western Electric Company
INCORPORATED

Please tell the Advertiser you saw his Advertisement in TELEPHONY.